

Sight Reduction Tables

Latitude 14° to 20°

Introduction.

The purpose and scope of these tables is to enable a navigator to establish his or her position at sea, or on land, using the Marc Saint Hilaire, or Intercept, method.

The author produced these tables with the objective of reducing the size of the printed tables to just what is required for his cruising latitude.

The tables cover 7 degrees of Latitude and Declination is limited to between 23°N and 23°S. Tables are provided for GHA and Declination interpolation and Sextant corrections. The Excel spreadsheet, from which this PDF file was generated, allows the navigator to enter the 'middle latitude' of his cruising ground. The tables are then produced using this middle latitude + and - 3°.

The tables have been designed primarily for establishing a Line of Position (LOP) from the altitude of the SUN. Two such LOPs, ideally either side of noon, giving a Sun-run-Sun calculated position.

LHA and Declination = SAME

For LHAs between 0° 360° to 90° 270°, the LHA is printed above and below the relevant table. The tabulated data is in normal text.

Where the LHA is > 90° and < 270°, the LHA is printed below the table while any tabulated Hc on the table is positive.

LHA and Declination = CONTRARY

For LHAs between 90° 270° and 0° 360° the LHA is printed above the table and the tabulated data is in **bold** text. The last contrary value of Hc in the relevant column is also underlined. Below that value the figures are for SAME.

When all the Hc° values are bold, indicating that there are no more SAME Hc° values, the LHA and text displayed at the bottom of the table changes accordingly.

NOTE

There are neither blank entries nor negative values for Hc° in these tables.

Accuracy and Precision

The tables were compiled using Microsoft Excel running under Microsoft Windows XP operating system.

Calculations were carried out to the full 15 decimal places, not precision as displayed.

These tables have been compared to the US National Imagery and Mapping Agency Sight Reduction Tables for Marine Navigation Pub229 with the following results.

No difference for Hc° has been identified by the author.

The difference in d' is occasionally 0.1'.

No difference in Z° has been identified by the author.

Disclaimer

While the author has taken great care with these tables, no warranty is implied or expressed as to their fitness for purpose.

North Lat. LHA > 180° ... Zn = Z LHA < 180° .. Zn= 360-Z

0° 360° LHA			Latitude SAME as Declination									0° 360° LHA										
Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	76°00.0'	+60.0'	180.0°	75°00.0'	+60.0'	180.0°	74°00.0'	+60.0'	180.0°	73°00.0'	+60.0'	180.0°	72°00.0'	+60.0'	180.0°	71°00.0'	+60.0'	180.0°	70°00.0'	+60.0'	180.0°	0
1	77°00.0'	+60.0'	180.0°	76°00.0'	+60.0'	180.0°	75°00.0'	+60.0'	180.0°	74°00.0'	+60.0'	180.0°	73°00.0'	+60.0'	180.0°	72°00.0'	+60.0'	180.0°	71°00.0'	+60.0'	180.0°	1
2	78°00.0'	+60.0'	180.0°	77°00.0'	+60.0'	180.0°	76°00.0'	+60.0'	180.0°	75°00.0'	+60.0'	180.0°	74°00.0'	+60.0'	180.0°	73°00.0'	+60.0'	180.0°	72°00.0'	+60.0'	180.0°	2
3	79°00.0'	+60.0'	180.0°	78°00.0'	+60.0'	180.0°	77°00.0'	+60.0'	180.0°	76°00.0'	+60.0'	180.0°	75°00.0'	+60.0'	180.0°	74°00.0'	+60.0'	180.0°	73°00.0'	+60.0'	180.0°	3
4	80°00.0'	+60.0'	180.0°	79°00.0'	+60.0'	180.0°	78°00.0'	+60.0'	180.0°	77°00.0'	+60.0'	180.0°	76°00.0'	+60.0'	180.0°	75°00.0'	+60.0'	180.0°	74°00.0'	+60.0'	180.0°	4
5	81°00.0'	+60.0'	180.0°	80°00.0'	+60.0'	180.0°	79°00.0'	+60.0'	180.0°	78°00.0'	+60.0'	180.0°	77°00.0'	+60.0'	180.0°	76°00.0'	+60.0'	180.0°	75°00.0'	+60.0'	180.0°	5
6	82°00.0'	+60.0'	180.0°	81°00.0'	+60.0'	180.0°	80°00.0'	+60.0'	180.0°	79°00.0'	+60.0'	180.0°	78°00.0'	+60.0'	180.0°	77°00.0'	+60.0'	180.0°	76°00.0'	+60.0'	180.0°	6
7	83°00.0'	+60.0'	180.0°	82°00.0'	+60.0'	180.0°	81°00.0'	+60.0'	180.0°	80°00.0'	+60.0'	180.0°	79°00.0'	+60.0'	180.0°	78°00.0'	+60.0'	180.0°	77°00.0'	+60.0'	180.0°	7
8	84°00.0'	+60.0'	180.0°	83°00.0'	+60.0'	180.0°	82°00.0'	+60.0'	180.0°	81°00.0'	+60.0'	180.0°	80°00.0'	+60.0'	180.0°	79°00.0'	+60.0'	180.0°	78°00.0'	+60.0'	180.0°	8
9	85°00.0'	+60.0'	180.0°	84°00.0'	+60.0'	180.0°	83°00.0'	+60.0'	180.0°	82°00.0'	+60.0'	180.0°	81°00.0'	+60.0'	180.0°	80°00.0'	+60.0'	180.0°	79°00.0'	+60.0'	180.0°	9
10	86°00.0'	+60.0'	180.0°	85°00.0'	+60.0'	180.0°	84°00.0'	+60.0'	180.0°	83°00.0'	+60.0'	180.0°	82°00.0'	+60.0'	180.0°	81°00.0'	+60.0'	180.0°	80°00.0'	+60.0'	180.0°	10
11	87°00.0'	+60.0'	179.9°	86°00.0'	+60.0'	180.0°	85°00.0'	+60.0'	180.0°	84°00.0'	+60.0'	180.0°	83°00.0'	+60.0'	180.0°	82°00.0'	+60.0'	180.0°	81°00.0'	+60.0'	180.0°	11
12	88°00.0'	+60.0'	180.0°	87°00.0'	+60.0'	179.9°	86°00.0'	+60.0'	180.0°	85°00.0'	+60.0'	180.0°	84°00.0'	+60.0'	180.0°	83°00.0'	+60.0'	180.0°	82°00.0'	+60.0'	180.0°	12
13	89°00.0'	+60.0'	180.0°	88°00.0'	+60.0'	180.0°	87°00.0'	+60.0'	179.9°	86°00.0'	+60.0'	180.0°	85°00.0'	+60.0'	180.0°	84°00.0'	+60.0'	180.0°	83°00.0'	+60.0'	180.0°	13
14	90°00.0'	-60.0'	90.0°	89°00.0'	+60.0'	180.0°	88°00.0'	+60.0'	180.0°	87°00.0'	+60.0'	179.9°	86°00.0'	+60.0'	180.0°	85°00.0'	+60.0'	180.0°	84°00.0'	+60.0'	180.0°	14
15	89°00.0'	-60.0'	0.0°	90°00.0'	-60.0'	90.0°	89°00.0'	+60.0'	180.0°	88°00.0'	+60.0'	180.0°	87°00.0'	+60.0'	179.9°	86°00.0'	+60.0'	180.0°	85°00.0'	+60.0'	180.0°	15
16	88°00.0'	-60.0'	0.0°	89°00.0'	-60.0'	0.0°	90°00.0'	-60.0'	90.0°	89°00.0'	+60.0'	180.0°	88°00.0'	+60.0'	180.0°	87°00.0'	+60.0'	179.9°	86°00.0'	+60.0'	180.0°	16
17	87°00.0'	-60.0'	0.1°	88°00.0'	-60.0'	0.0°	89°00.0'	-60.0'	0.0°	90°00.0'	-60.0'	90.0°	89°00.0'	+60.0'	180.0°	88°00.0'	+60.0'	180.0°	87°00.0'	+60.0'	179.9°	17
18	86°00.0'	-60.0'	0.0°	87°00.0'	-60.0'	0.1°	88°00.0'	-60.0'	0.0°	89°00.0'	-60.0'	0.0°	90°00.0'	-60.0'	90.0°	89°00.0'	+60.0'	180.0°	88°00.0'	+60.0'	180.0°	18
19	85°00.0'	-60.0'	0.0°	86°00.0'	-60.0'	0.0°	87°00.0'	-60.0'	0.1°	88°00.0'	-60.0'	0.0°	89°00.0'	-60.0'	0.0°	90°00.0'	-60.0'	90.0°	89°00.0'	+60.0'	180.0°	19
20	84°00.0'	-60.0'	0.0°	85°00.0'	-60.0'	0.0°	86°00.0'	-60.0'	0.0°	87°00.0'	-60.0'	0.1°	88°00.0'	-60.0'	0.0°	89°00.0'	-60.0'	0.0°	90°00.0'	-60.0'	90.0°	20
21	83°00.0'	-60.0'	0.0°	84°00.0'	-60.0'	0.0°	85°00.0'	-60.0'	0.0°	86°00.0'	-60.0'	0.0°	87°00.0'	-60.0'	0.1°	88°00.0'	-60.0'	0.0°	89°00.0'	-60.0'	0.0°	21
22	82°00.0'	-60.0'	0.0°	83°00.0'	-60.0'	0.0°	84°00.0'	-60.0'	0.0°	85°00.0'	-60.0'	0.0°	86°00.0'	-60.0'	0.0°	87°00.0'	-60.0'	0.1°	88°00.0'	-60.0'	0.0°	22
23	81°00.0'	-60.0'	0.0°	82°00.0'	-60.0'	0.0°	83°00.0'	-60.0'	0.0°	84°00.0'	-60.0'	0.0°	85°00.0'	-60.0'	0.0°	86°00.0'	-60.0'	0.0°	87°00.0'	-60.0'	0.1°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

0° 360° LHA

Latitude SAME as Declination

0° 360° LHA

South Lat. LHA > 180° .. Zn = 180-Z LHA < 180° .. Zn= 180+Z

North Lat. LHA > 180° ... Zn = Z LHA < 180° .. Zn= 360-Z

1° 359° LHA			Latitude SAME as Declination									1° 359° LHA										
Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	75°57.9'	+59.8'	175.9°	74°58.0'	+59.9'	176.1°	73°58.2'	+59.9'	176.4°	72°58.3'	+59.9'	176.6°	71°58.4'	+59.9'	176.8°	70°58.5'	+59.9'	176.9°	69°58.6'	+59.9'	177.1°	0
1	76°57.7'	+59.8'	175.6°	75°57.9'	+59.8'	175.9°	74°58.1'	+59.9'	176.1°	73°58.2'	+59.9'	176.4°	72°58.3'	+59.9'	176.6°	71°58.4'	+59.9'	176.8°	70°58.5'	+59.9'	176.9°	1
2	77°57.6'	+59.8'	175.2°	76°57.8'	+59.8'	175.6°	75°57.9'	+59.8'	175.9°	74°58.1'	+59.9'	176.1°	73°58.2'	+59.9'	176.4°	72°58.3'	+59.9'	176.6°	71°58.4'	+59.9'	176.8°	2
3	78°57.3'	+59.7'	174.8°	77°57.6'	+59.8'	175.2°	76°57.8'	+59.8'	175.6°	75°57.9'	+59.8'	175.9°	74°58.1'	+59.9'	176.1°	73°58.2'	+59.9'	176.4°	72°58.3'	+59.9'	176.6°	3
4	79°57.1'	+59.7'	174.3°	78°57.4'	+59.7'	174.3°	77°57.6'	+59.8'	175.2°	76°57.8'	+59.8'	175.6°	75°57.9'	+59.8'	175.9°	74°58.1'	+59.9'	176.2°	73°58.2'	+59.9'	176.4°	4
5	80°56.8'	+59.7'	173.7°	79°57.1'	+59.7'	174.3°	78°57.4'	+59.8'	174.8°	77°57.6'	+59.8'	175.2°	76°57.8'	+59.9'	175.6°	75°58.0'	+59.9'	175.9°	74°58.1'	+59.9'	176.2°	5
6	81°56.4'	+59.5'	172.9°	80°56.8'	+59.6'	173.7°	79°57.2'	+59.7'	174.3°	78°57.4'	+59.8'	174.8°	77°57.7'	+59.8'	175.3°	76°57.8'	+59.8'	175.6°	75°58.0'	+59.9'	175.9°	6
7	82°55.9'	+59.3'	172.0°	81°56.5'	+59.5'	172.9°	80°56.9'	+59.6'	173.7°	79°57.2'	+59.7'	174.3°	78°57.4'	+59.8'	174.8°	77°57.7'	+59.8'	175.3°	76°57.9'	+59.8'	175.6°	7
8	83°55.3'	+59.1'	170.7°	82°56.0'	+59.4'	172.0°	81°56.5'	+59.5'	173.0°	80°56.9'	+59.6'	173.7°	79°57.2'	+59.7'	174.3°	78°57.5'	+59.8'	174.9°	77°57.7'	+59.8'	175.3°	8
9	84°54.4'	+58.7'	168.9°	83°55.3'	+59.1'	170.7°	82°56.0'	+59.4'	172.0°	81°56.5'	+59.5'	173.0°	80°56.9'	+59.6'	173.7°	79°57.2'	+59.7'	174.4°	78°57.5'	+59.8'	174.9°	9
10	85°53.0'	+57.8'	166.2°	84°54.4'	+58.7'	168.9°	83°55.3'	+59.1'	170.7°	82°56.0'	+59.4'	172.0°	81°56.5'	+59.5'	173.0°	80°56.9'	+59.6'	173.8°	79°57.2'	+59.7'	174.4°	10
11	86°50.8'	+55.9'	162.0°	85°53.1'	+57.8'	166.3°	84°54.5'	+58.7'	168.9°	83°55.4'	+59.1'	170.7°	82°56.1'	+59.4'	172.0°	81°56.6'	+59.5'	173.0°	80°57.0'	+59.6'	173.8°	11
12	87°46.7'	+49.9'	154.1°	86°50.9'	+55.9'	162.0°	85°53.1'	+57.8'	166.3°	84°54.5'	+58.7'	169.0°	83°55.4'	+59.1'	170.8°	82°56.1'	+59.4'	172.1°	81°56.6'	+59.5'	173.0°	12
13	88°36.6'	+25.6'	135.9°	87°46.8'	+50.0'	154.1°	86°51.0'	+55.9'	162.1°	85°53.2'	+57.9'	166.4°	84°54.6'	+58.7'	169.0°	83°55.5'	+59.1'	170.8°	82°56.1'	+59.4'	172.1°	13
14	89°02.1'	-25.4'	89.9°	88°36.7'	+25.7'	136.0°	87°46.9'	+50.0'	154.2°	86°51.1'	+56.0'	162.2°	85°53.3'	+57.9'	166.4°	84°54.6'	+58.7'	169.1°	83°55.5'	+59.1'	170.8°	14
15	88°36.7'	-49.8'	43.8°	89°02.4'	-25.5'	89.9°	88°36.9'	+25.8'	136.1°	87°47.0'	+50.1'	154.3°	86°51.1'	+56.0'	162.2°	85°53.3'	+57.9'	166.5°	84°54.7'	+58.7'	169.1°	15
16	87°46.9'	-55.8'	25.5°	88°36.9'	-49.9'	43.6°	89°02.7'	-25.6'	89.9°	88°37.1'	+25.9'	136.2°	87°47.1'	+50.2'	154.4°	86°51.2'	+56.0'	162.3°	85°53.4'	+57.9'	166.5°	16
17	86°51.1'	-57.8'	17.6°	87°47.0'	-55.9'	25.4°	88°37.1'	-50.0'	43.5°	89°03.0'	-25.6'	89.9°	88°37.3'	+26.0'	136.4°	87°47.3'	+50.3'	154.5°	86°51.3'	+56.1'	162.4°	17
18	85°53.3'	-58.6'	13.3°	86°51.1'	-57.8'	17.5°	87°47.1'	-55.9'	25.3°	88°37.3'	-50.1'	43.3°	89°03.3'	-25.7'	89.8°	88°37.6'	+26.1'	136.5°	87°47.4'	+50.4'	154.7°	18
19	84°54.6'	-59.1'	10.7°	85°53.3'	-58.7'	13.2°	86°51.2'	-57.8'	17.4°	87°47.3'	-55.9'	25.1°	88°37.6'	-25.8'	43.1°	89°03.6'	-25.8'	89.8°	88°37.8'	+26.2'	136.7°	19
20	83°55.5'	-59.3'	8.9°	84°54.7'	-59.1'	10.6°	85°53.4'	-58.7'	13.1°	86°51.3'	-57.9'	17.3°	87°47.4'	-56.0'	25.0°	88°37.8'	-50.2'	43.0°	89°04.0'	-25.9'	89.8°	20
21	82°56.2'	-59.5'	7.6°	83°55.6'	-59.3'	8.8°	84°54.7'	-59.1'	10.5°	85°53.5'	-58.7'	13.1°	86°51.4'	-57.9'	17.2°	87°47.6'	-56.0'	24.9°	88°38.0'	-50.3'	42.8°	21
22	81°56.7'	-59.																				

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

2° 358° LHA		Latitude SAME as Declination										2° 358° LHA										
Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	75°51.6'	+59.4'	171.8°	74°52.2'	+59.5'	172.3°	73°52.7'	+59.5'	172.8°	72°53.2'	+59.6'	173.2°	71°53.6'	+59.6'	173.6°	70°53.9'	+59.7'	173.9°	69°54.3'	+59.7'	174.2°	0
1	76°51.0'	+59.3'	171.2°	75°51.7'	+59.4'	171.8°	74°52.3'	+59.5'	172.3°	73°52.8'	+59.5'	172.8°	72°53.2'	+59.6'	173.2°	71°53.6'	+59.6'	173.6°	70°54.0'	+59.7'	173.9°	1
2	77°50.3'	+59.2'	170.5°	76°51.1'	+59.3'	171.2°	75°51.7'	+59.4'	171.8°	74°52.3'	+59.5'	172.3°	73°52.8'	+59.5'	172.8°	72°53.3'	+59.6'	173.2°	71°53.7'	+59.6'	173.6°	2
3	78°49.4'	+59.0'	169.6°	77°50.3'	+59.2'	170.5°	76°51.1'	+59.3'	171.2°	75°51.8'	+59.4'	171.8°	74°52.3'	+59.5'	172.3°	73°52.9'	+59.5'	172.8°	72°53.3'	+59.6'	173.2°	3
4	79°48.4'	+58.8'	168.7°	78°49.5'	+59.0'	169.7°	77°50.4'	+59.2'	170.5°	76°51.2'	+59.3'	171.2°	75°51.8'	+59.4'	171.8°	74°52.4'	+59.5'	172.3°	73°52.9'	+59.6'	173.2°	4
5	80°47.2'	+69.3'	167.5°	79°48.5'	+68.4'	168.7°	78°49.6'	+67.7'	169.7°	77°50.5'	+67.1'	170.5°	76°51.2'	+66.5'	171.2°	75°51.9'	+66.0'	171.8°	74°52.5'	+65.6'	172.3°	5
6	81°56.6'	+59.5'	173.1°	80°56.9'	+59.6'	173.8°	79°57.3'	+59.7'	174.4°	78°57.5'	+59.8'	174.9°	77°57.7'	+59.8'	175.3°	76°57.9'	+59.8'	175.7°	75°58.1'	+59.9'	176.0°	6
7	82°56.1'	+59.4'	172.1°	81°56.6'	+59.5'	173.1°	80°57.0'	+59.6'	173.8°	79°57.3'	+59.7'	174.4°	78°57.5'	+59.8'	174.9°	77°57.8'	+59.8'	175.3°	76°57.9'	+59.8'	175.7°	7
8	83°55.4'	+59.1'	170.8°	82°56.1'	+59.4'	172.1°	81°56.6'	+59.5'	173.1°	80°57.0'	+59.6'	173.8°	79°57.3'	+59.7'	174.4°	78°57.6'	+59.8'	174.9°	77°57.8'	+59.8'	175.4°	8
9	84°54.6'	+58.7'	169.1°	83°55.5'	+59.1'	170.9°	82°56.1'	+59.4'	172.1°	81°56.6'	+59.5'	173.1°	80°57.0'	+59.6'	173.9°	79°57.3'	+59.7'	174.5°	78°57.6'	+59.8'	175.0°	9
10	85°53.3'	+57.9'	166.5°	84°54.6'	+58.7'	169.1°	83°55.5'	+59.1'	170.9°	82°56.2'	+59.4'	172.2°	81°56.7'	+59.5'	173.1°	80°57.0'	+59.6'	173.9°	79°57.3'	+59.7'	174.5°	10
11	86°51.1'	+56.0'	162.3°	85°53.3'	+57.9'	166.5°	84°54.6'	+58.7'	169.1°	83°55.5'	+59.1'	170.9°	82°56.2'	+59.4'	172.2°	81°56.7'	+59.5'	173.1°	80°57.1'	+59.7'	173.9°	11
12	87°47.1'	+50.2'	154.5°	86°51.2'	+56.0'	162.3°	85°53.4'	+57.9'	166.6°	84°54.7'	+58.7'	169.2°	83°55.6'	+59.2'	170.9°	82°56.2'	+59.4'	172.2°	81°56.7'	+59.6'	173.2°	12
13	88°37.3'	+25.9'	136.4°	87°47.2'	+50.2'	154.5°	86°51.3'	+56.1'	162.4°	85°53.4'	+57.9'	166.6°	84°54.7'	+58.7'	169.2°	83°55.6'	+59.2'	171.0°	82°56.3'	+59.4'	172.2°	13
14	89°03.2'	-25.7'	89.9°	88°37.4'	+26.0'	136.5°	87°47.3'	+50.3'	154.6°	86°51.4'	+56.1'	162.5°	85°53.5'	+58.0'	166.7°	84°54.8'	+58.8'	169.3°	83°55.7'	+59.2'	171.0°	14
15	88°37.4'	-50.1'	43.3°	89°03.4'	-25.8'	89.9°	88°37.6'	+26.1'	136.6°	87°47.5'	+50.4'	154.7°	86°51.4'	+56.1'	162.5°	85°53.6'	+58.0'	166.7°	84°54.8'	+58.8'	169.3°	15
16	87°47.3'	-56.0'	25.1°	88°37.6'	-50.2'	43.1°	89°03.7'	-25.9'	89.9°	88°37.8'	+26.2'	136.8°	87°47.6'	+50.5'	154.8°	86°51.5'	+56.2'	162.6°	85°53.6'	+58.0'	166.8°	16
17	86°51.4'	-57.9'	17.3°	87°47.5'	-56.0'	25.0°	88°37.8'	-50.2'	43.0°	89°04.0'	-26.0'	89.9°	88°38.0'	+26.3'	136.9°	87°47.7'	+50.5'	154.9°	86°51.6'	+56.2'	162.7°	17
18	85°53.5'	-58.7'	13.1°	86°51.4'	-57.9'	17.2°	87°47.6'	-56.0'	24.9°	88°38.0'	-50.3'	42.8°	89°04.3'	-26.1'	89.8°	88°38.2'	+26.4'	137.1°	87°47.8'	+50.6'	155.1°	18
19	84°54.8'	-59.1'	10.5°	85°53.6'	-58.7'	13.0°	86°51.5'	-57.9'	17.1°	87°47.7'	-56.1'	24.8°	88°38.2'	-50.4'	42.6°	89°04.6'	-26.2'	89.8°	88°38.5'	+26.5'	137.2°	19
20	83°55.7'	-59.4'	8.7°	84°54.8'	-59.1'	10.4°	85°53.6'	-58.7'	12.9°	86°51.6'	-57.9'	17.0°	87°47.8'	-56.1'	24.6°	88°38.5'	-50.5'	42.5°	89°05.0'	-26.3'	89.8°	20
21	82°56.3'	-59.5'	7.4°	83°55.7'	-59.4'	8.6°	84°54.9'	-59.1'	10.3°	85°53.7'	-58.7'	12.8°	86°51.7'	-58.0'	16.9°	87°48.0'	-56.2'	24.5°	88°38.7'	-50.6'	42.3°	21
22	81°56.8'	-59.6'	6.5°	82°56.3'	-59.5'	7.4°	83°55.8'	-59.4'	8.6°	84°55.0'	-59.1'	10.3°	85°53.8'	-58.7'	12.8°	86°51.8'	-58.0'	16.8°	87°48.1'	-56.2'	24.3°	22
23	80°57.2'	-59.7'	5.7°	81°56.8'	-59.6'	6.4°	82°56.4'	-59.5'	7.3°	83°55.8'	-59.4'	8.5°	84°55.0'	-59.2'	10.2°	85°53.9'	-58.8'	12.7°	86°51.9'	-58.0'	16.7°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

2° 358° LHA Latitude SAME as Declination 2° 358° LHA
 South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

3° 357° LHA		Latitude SAME as Declination										3° 357° LHA										
Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	75°41.3'	+58.6'	167.8°	74°42.6'	+58.8'	168.6°	73°43.7'	+59.0'	169.2°	72°44.7'	+59.1'	169.8°	71°45.6'	+59.2'	170.4°	70°46.4'	+59.3'	170.9°	69°47.1'	+59.4'	171.3°	0
1	76°39.9'	+58.4'	166.9°	75°41.4'	+58.6'	167.8°	74°42.7'	+58.8'	168.6°	73°43.8'	+59.0'	169.2°	72°44.8'	+59.1'	169.8°	71°45.7'	+59.2'	170.4°	70°46.5'	+59.3'	170.9°	1
2	77°38.3'	+58.1'	165.9°	76°40.0'	+58.4'	166.9°	75°41.5'	+58.7'	167.8°	74°42.8'	+58.8'	168.6°	73°43.9'	+59.0'	169.2°	72°44.9'	+59.1'	169.8°	71°45.8'	+59.2'	170.4°	2
3	78°36.5'	+57.8'	164.7°	77°38.5'	+58.2'	165.9°	76°40.1'	+58.4'	166.9°	75°41.6'	+58.7'	167.8°	74°42.9'	+58.8'	168.6°	73°44.0'	+59.0'	169.2°	72°45.0'	+59.1'	169.8°	3
4	79°34.3'	+57.3'	163.2°	78°36.6'	+57.8'	164.7°	77°38.6'	+58.2'	165.9°	76°40.3'	+58.5'	166.9°	75°41.7'	+58.7'	167.8°	74°43.0'	+58.9'	168.6°	73°44.1'	+59.0'	169.3°	4
5	80°31.6'	+56.7'	161.5°	79°34.4'	+57.4'	163.3°	78°36.8'	+57.8'	164.7°	77°38.7'	+58.2'	165.9°	76°40.4'	+58.5'	166.9°	75°41.8'	+58.7'	167.8°	74°43.1'	+58.9'	168.6°	5
6	81°28.4'	+55.9'	159.5°	80°31.8'	+56.8'	161.6°	79°34.6'	+57.4'	163.3°	78°36.9'	+57.9'	164.7°	77°38.9'	+58.2'	165.9°	76°40.5'	+58.5'	166.9°	75°42.0'	+58.7'	167.8°	6
7	82°24.3'	+54.7'	156.9°	81°28.6'	+55.9'	159.5°	80°32.0'	+56.8'	161.6°	79°34.8'	+57.4'	163.3°	78°37.1'	+57.9'	164.7°	77°39.0'	+58.2'	165.9°	76°40.7'	+58.5'	167.0°	7
8	83°19.0'	+53.0'	153.6°	82°24.5'	+54.8'	156.9°	81°28.8'	+56.0'	159.5°	80°32.2'	+56.8'	161.6°	79°35.0'	+57.4'	163.3°	78°37.3'	+57.9'	164.8°	77°39.2'	+58.3'	166.0°	8
9	84°12.0'	+50.3'	149.2°	83°19.3'	+53.1'	153.6°	82°24.8'	+54.8'	157.0°	81°29.0'	+56.0'	159.6°	80°32.4'	+56.9'	161.7°	79°35.2'	+57.5'	163.4°	78°37.5'	+57.9'	164.8°	9
10	85°02.4'	+46.1'	143.4°	84°12.4'	+50.4'	149.3°	83°19.6'	+53.1'	153.7°	82°25.0'	+54.9'	157.0°	81°29.3'	+56.1'	159.6°	80°32.6'	+56.9'	161.7°	79°35.4'	+57.5'	163.4°	10
11	85°48.5'	+39.0'	135.4°	85°02.8'	+46.2'	143.5°	84°12.7'	+50.5'	149.4°	83°19.9'	+53.2'	153.7°	82°25.3'	+54.9'	157.1°	81°29.5'	+56.1'	159.7°	80°32.9'	+56.9'	161.8°	11
12	86°27.5'	+27.5'	124.0°	85°49.0'	+39.2'	135.4°	85°03.2'	+46.3'	143.6°	84°13.1'	+50.6'	149.5°	83°20.3'	+53.2'	153.8°	82°25.6'	+55.0'	157.1°	81°29.8'	+56.1'	159.7°	12
13	86°55.0'	+10.4'	108.6°	86°28.1'	+27.6'	124.1°	85°49.5'	+39.3'	135.5°	85°03.7'	+46.4'	143.7°	84°13.5'	+50.7'	149.5°	83°20.6'	+53.3'	153.9°	82°26.0'	+55.0'	157.2°	13
14	87°05.3'	-09.7'	89.6°	86°55.7'	+10.4'	108.6°	86°28.8'	+27.7'	124.2°	85°50.0'	+39.4'	135.7°	85°04.2'	+46.5'	143.8°	84°13.9'	+50.7'	149.6°	83°21.0'	+53.4'	154.0°	14
15	86°55.7'	-26.9'	70.6°	87°06.1'	-09.7'	89.6°	86°56.5'	+10.5'	108.7°	86°29.4'	+27.8'	124.3°	85°50.6'	+39.5'	135.8°	85°04.7'	+46.6'	143.9°	84°14.4'	+50.8'	149.8°	15
16	86°28.8'	-38.7'	55.0°	86°56.5'	-27.0'	70.5°	87°07.0'	-09.7'	89.6°	86°57.3'	+10.6'	108.7°	86°30.2'	+28.0'	124.4°	85°51.3'	+39.7'	135.9°	85°05.2'	+46.7'	144.0°	16
17	85°50.0'	-45.9'	43.5°	86°29.4'	-38.8'	54.9°	86°57.3'	-27.1'	70.4°	87°07.9'	-09.7'	89.6°	86°58.2'	+10.7'	108.8°	86°31.0'	+28.1'	124.6°	85°52.0'	+39.8'	136.0°	17
18	85°04.2'	-50.2'	35.4°	85°50.6'	-46.0'	43.4°	86°30.2'	-38.9'	54.7°	86°58.2'	-27.2'	70.3°	87°08.8'	-09.7'	89.5°	86°59.1'	+10.7'	108.9°	86°31.8'	+28.3'	124.7°	18
19	84°13.9'	-52.9'	29.5°	85°04.7'	-50.3'	35.2°	85°51.3'	-46.1'	43.2°	86°31.0'	-29.0'	54.5°	86°59.1'	-27.3'	70.2°	87°09.8'	-09.8'	89.5°	87°00.0'	+10.8'	109.0°	19
20	83°21.0'	-54.7'	25.1°	84°14.4'	-53.0'	29.3°	85°05.2'	-50.4'	35.0°	85°52.0'	-46.1'	43.0°	86°31.8'	-29.1'	54.3°	87°00.0'	-27.4'	70.0°	87°10.9'	-09.8'	89.5°	20
21	82°26.3'	-55.9'	21.8°	83°21.4'	-54.7'	25.0°	84°14.9'	-53.0'	29.2°	85°05.8'	-50.4'	34.9°	85°52.7'	-46.2'	42.8°	86°32.6'	-39.2'	54.1°	87°01.0'	-27.5'	69.9°	21
22	81°30.4'	-56.7'	19.2°	82°26.7'	-55.9'	21.7°	83°21.8'	-5														

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

4° 356° LHA			Latitude SAME as Declination						4° 356° LHA																
Dec°	14			15			16			17			18			19			20			Dec°			
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°				
0	75°27.0'	+57.6'	163.9°	74°29.3'	+57.9'	164.9°	73°31.2'	+58.2'	165.8°	72°33.0'	+58.4'	166.5°	71°34.5'	+58.6'	167.2°	70°35.9'	+58.7'	167.9°	69°37.2'	+58.9'	168.4°	0			
1	76°24.7'	+57.3'	162.7°	75°27.2'	+57.6'	163.9°	74°29.4'	+58.0'	164.9°	73°31.4'	+58.2'	165.8°	72°33.1'	+58.4'	166.5°	71°34.7'	+58.6'	167.2°	70°36.1'	+58.8'	167.9°	1			
2	77°21.9'	+56.8'	161.4°	76°24.8'	+57.3'	162.7°	75°27.4'	+57.7'	163.9°	74°29.6'	+58.0'	164.9°	73°31.5'	+58.2'	165.8°	72°33.3'	+58.4'	166.6°	71°34.8'	+58.6'	167.3°	2			
3	78°18.7'	+56.2'	159.9°	77°22.1'	+56.8'	161.4°	76°25.0'	+57.3'	162.7°	75°27.6'	+57.7'	163.9°	74°29.8'	+58.0'	164.9°	73°31.7'	+58.3'	165.8°	72°33.5'	+58.5'	166.6°	3			
4	79°15.0'	+55.5'	158.1°	78°19.0'	+56.3'	159.9°	77°22.3'	+56.9'	161.4°	76°25.2'	+57.3'	162.8°	75°27.8'	+57.7'	163.9°	74°30.0'	+58.0'	164.9°	73°31.9'	+58.3'	165.8°	4			
5	80°10.5'	+54.6'	156.0°	79°15.2'	+55.6'	158.1°	78°19.2'	+56.3'	159.9°	77°22.6'	+56.9'	161.5°	76°25.5'	+57.4'	162.8°	75°28.0'	+57.7'	163.9°	74°30.2'	+58.0'	164.9°	5			
6	81°05.1'	+53.3'	153.4°	80°10.8'	+54.6'	156.0°	79°15.5'	+55.6'	158.1°	78°19.5'	+56.3'	160.0°	77°22.8'	+56.9'	161.5°	76°25.7'	+57.4'	162.8°	75°28.2'	+57.8'	163.9°	6			
7	81°58.3'	+51.5'	150.3°	81°05.4'	+53.3'	153.4°	80°11.1'	+54.6'	156.0°	79°15.8'	+55.6'	158.2°	78°19.8'	+56.4'	160.0°	77°23.1'	+57.0'	161.5°	76°28.0'	+57.4'	162.8°	7			
8	82°49.8'	+49.0'	146.4°	81°58.7'	+51.6'	150.3°	81°05.8'	+53.4'	153.5°	80°11.5'	+54.7'	156.1°	79°16.2'	+55.7'	158.2°	78°20.1'	+56.4'	160.0°	77°23.4'	+57.0'	161.6°	8			
9	83°38.9'	+45.5'	141.5°	82°50.3'	+49.1'	146.5°	81°59.1'	+51.6'	150.4°	81°06.2'	+53.4'	153.5°	80°11.8'	+54.7'	156.1°	79°16.5'	+55.7'	158.3°	78°20.4'	+56.5'	160.1°	9			
10	84°24.3'	+40.2'	135.2°	83°39.4'	+45.6'	141.6°	82°50.8'	+49.2'	146.5°	81°59.6'	+51.7'	150.4°	81°06.6'	+53.5'	153.6°	80°12.2'	+54.8'	156.2°	79°16.9'	+55.8'	158.3°	10			
11	85°04.6'	+32.6'	127.1°	84°25.0'	+40.4'	135.3°	83°40.0'	+45.7'	141.6°	82°51.3'	+49.3'	146.6°	82°00.1'	+51.8'	150.5°	81°07.1'	+53.6'	153.7°	80°12.7'	+54.9'	156.2°	11			
12	85°37.2'	+21.9'	116.7°	85°05.3'	+32.7'	127.2°	84°25.6'	+40.5'	135.4°	83°40.6'	+45.8'	141.7°	82°51.9'	+49.4'	146.7°	82°00.6'	+51.9'	150.6°	81°07.5'	+53.6'	153.7°	12			
13	85°59.0'	+08.1'	103.9°	85°38.0'	+22.0'	116.8°	85°06.1'	+32.9'	127.2°	84°26.4'	+40.6'	135.5°	83°41.3'	+45.9'	141.8°	82°52.5'	+49.5'	146.8°	82°01.2'	+52.0'	150.7°	13			
14	86°07.1'	-07.1'	89.5°	86°00.0'	+08.2'	104.0°	85°39.0'	+22.1'	116.8°	85°07.0'	+33.0'	127.3°	84°27.1'	+40.7'	135.6°	83°42.0'	+46.0'	141.9°	82°53.1'	+49.6'	146.9°	14			
15	86°00.0'	-21.1'	75.0°	86°08.2'	-07.1'	89.5°	86°01.1'	+08.2'	104.0°	85°40.0'	+22.2'	116.9°	85°07.9'	+33.2'	127.5°	84°28.0'	+40.9'	135.7°	83°42.7'	+46.1'	142.0°	15			
16	85°39.0'	-32.0'	62.1°	86°01.1'	-21.1'	74.9°	86°09.3'	-07.1'	89.4°	86°02.2'	+08.3'	104.0°	85°41.0'	+22.4'	117.0°	85°08.8'	+33.3'	127.6°	84°28.8'	+41.0'	135.8°	16			
17	85°07.0'	-39.8'	51.6°	85°40.0'	-32.1'	62.0°	86°02.2'	-21.2'	74.8°	86°10.5'	-07.1'	89.4°	86°03.4'	+08.4'	104.1°	85°42.1'	+22.5'	117.1°	85°09.9'	+33.5'	127.7°	17			
18	84°27.1'	-45.2'	43.3°	85°07.9'	-39.9'	51.4°	85°41.0'	-32.2'	61.8°	86°03.4'	-21.2'	74.7°	86°11.8'	-07.1'	89.4°	86°04.6'	+08.4'	104.1°	85°43.3'	+22.6'	117.2°	18			
19	83°42.0'	-48.8'	36.9°	84°28.0'	-45.3'	43.2°	85°08.8'	-40.0'	51.2°	85°42.1'	-32.3'	61.7°	86°04.6'	-21.3'	74.6°	86°13.1'	-07.1'	89.3°	86°06.0'	+08.5'	104.2°	19			
20	82°53.1'	-51.4'	32.0°	83°42.7'	-48.9'	36.8°	84°28.8'	-45.3'	43.0°	85°09.9'	-40.1'	51.0°	85°43.3'	-32.4'	61.5°	86°06.0'	-21.4'	74.5°	86°14.5'	-07.1'	89.3°	20			
21	82°01.8'	-53.2'	28.0°	82°53.8'	-51.4'	31.8°	83°43.5'	-49.0'	36.6°	84°29.8'	-45.4'	42.8°	85°10.9'	-40.2'	50.8°	85°44.6'	-32.5'	61.3°	86°07.3'	-21.5'	74.4°	21			
22	81°08.6'	-54.5'	24.8°	82°02.4'	-53.2'	27.8°	82°54.5'	-51.5'	31.6°	83°44.3'	-49.0'	36.4°	84°30.7'	-45.5'	42.6°	85°12.0'	-40.3'	50.6°	85°45.8'	-32.6'	61.1°	22			
23	80°14.1'	-55.5'	22.2°	81°09.2'	-54.5'	24.7°	82°03.0'	-53.3'	27.7°	82°55.3'	-51.6'	31.4°	83°45.2'	-49.1'	36.2°	84°31.7'	-45.6'	42.3°	85°13.2'	-40.5'	50.4°	23			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20						

4° 356° LHA

Latitude SAME as Declination

4° 356° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

5° 355° LHA			Latitude SAME as Declination						5° 355° LHA													
Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	75°09.0'	+56.4'	160.1°	74°12.4'	+56.9'	161.3°	73°15.4'	+57.3'	162.4°	72°18.0'	+57.6'	163.3°	71°20.4'	+57.8'	164.2°	70°22.6'	+58.1'	165.0°	69°24.6'	+58.3'	165.7°	0
1	76°05.5'	+55.9'	158.7°	75°09.3'	+56.4'	160.1°	74°12.6'	+56.9'	161.3°	73°15.6'	+57.3'	162.4°	72°18.3'	+57.6'	163.3°	71°20.7'	+57.9'	164.2°	70°22.8'	+58.1'	165.0°	1
2	77°01.3'	+55.2'	157.2°	76°05.7'	+55.9'	158.7°	75°09.5'	+56.5'	160.1°	74°12.9'	+56.9'	161.3°	73°15.9'	+57.3'	162.4°	72°18.5'	+57.6'	163.3°	71°20.9'	+57.9'	164.2°	2
3	77°56.6'	+54.4'	155.4°	77°01.6'	+55.3'	157.2°	76°06.0'	+56.0'	158.8°	75°09.8'	+56.5'	160.1°	74°13.2'	+57.0'	161.3°	73°16.2'	+57.3'	162.4°	72°18.8'	+57.7'	163.4°	3
4	78°51.0'	+53.4'	153.3°	77°56.9'	+54.5'	155.4°	77°02.0'	+55.3'	157.2°	76°06.3'	+56.0'	158.8°	75°10.1'	+56.5'	160.1°	74°13.5'	+57.0'	161.3°	73°16.5'	+57.4'	162.4°	4
5	79°44.4'	+52.1'	150.8°	78°51.4'	+53.5'	153.3°	77°57.3'	+54.5'	155.4°	77°02.3'	+55.4'	157.2°	76°06.7'	+56.0'	158.8°	75°10.5'	+56.6'	160.2°	74°13.8'	+57.0'	161.4°	5
6	80°36.5'	+50.4'	147.9°	79°44.8'	+52.2'	150.9°	78°51.8'	+53.5'	153.3°	77°57.7'	+54.6'	155.4°	77°02.7'	+55.4'	157.3°	76°07.1'	+56.1'	158.8°	75°10.9'	+56.6'	160.2°	6
7	81°26.9'	+48.1'	144.4°	80°37.0'	+50.5'	148.0°	79°45.3'	+52.2'	150.9°	78°52.3'	+53.6'	153.4°	77°58.1'	+54.6'	155.5°	77°03.2'	+55.5'	157.3°	76°07.5'	+56.1'	158.9°	7
8	82°15.0'	+45.1'	140.2°	81°27.5'	+48.2'	144.5°	80°37.6'	+50.5'	148.0°	79°45.9'	+52.3'	150.9°	78°52.8'	+53.6'	153.4°	77°58.6'	+54.7'	155.5°	76°07.9'	+56.1'	158.9°	8
9	83°00.0'	+40.9'	135.1°	82°15.7'	+45.2'	140.3°	81°28.1'	+48.3'	144.5°	80°38.1'	+50.6'	148.1°	79°46.4'	+52.4'	151.0°	78°53.3'	+53.7'	153.5°	77°59.1'	+54.7'	155.6°	9
10	83°41.0'	+35.3'	128.7°	83°00.8'	+41.0'	135.1°	82°16.4'	+45.3'	140.3°	81°28.8'	+48.4'	144.6°	80°38.8'	+50.7'	148.1°	79°47.0'	+52.4'	151.1°	78°53.9'	+53.8'	153.5°	10
11	84°16.3'	+27.8'	121.0°	83°41.8'	+35.4'	128.8°	83°01.6'	+41.2'	135.2°	82°17.1'	+45.4'	140.4°	81°29.5'	+48.5'	144.7°	80°39.5'	+50.8'	148.2°	79°47.7'	+52.5'	151.1°	11
12	84°44.0'	+18.2'	111.7°	84°17.3'	+27.9'	121.1°	83°42.8'	+35.6'	128.9°	83°02.5'	+41.3'	135.3°	82°18.0'	+45.5'	140.5°	81°30.3'	+48.6'	144.8°	80°40.2'	+50.9'	148.3°	12
13	85°02.2'	+06.7'	101.0°	84°45.2'	+18.3'	111.8°	84°18.3'	+28.0'	121.1°	83°43.8'	+35.7'	129.0°	83°03.5'	+41.4'	135.4°	82°18.8'	+45.6'	140.6°	81°31.1'	+48.7'	144.8°	13
14	85°08.9'	-05.5'	89.4°	85°03.4'	+06.8'	101.0°	84°46.4'	+18.4'	111.8°	84°19.5'	+28.2'	121.2°	83°44.9'	+35.8'	129.1°	83°04.5'	+41.6'	135.5°	82°19.8'	+45.7'	140.7°	14
15	85°03.4'	-17.1'	77.7°	85°10.2'	-05.5'	89.4°	85°04.8'	+06.9'	101.0°	84°47.7'	+18.5'	111.9°	84°20.7'	+28.3'	121.3°	83°04.6'	+41.6'	135.5°	82°20.8'	+45.8'	140.8°	15
16	84°46.4'	-26.9'	66.9°	85°04.8'	-17.1'	77.6°	85°11.6'	-05.5'	89.3°	85°06.2'	+06.9'	101.1°	84°49.0'	+18.6'	112.0°	84°22.0'	+28.5'	121.4°	83°47.2'	+36.2'	129.3°	16
17	84°19.5'	-34.6'	57.4°	84°47.7'	-27.0'	66.7°	85°06.2'	-17.1'	77.5°	85°13.1'	-05.4'	89.3°	85°07.7'	+07.0'	101.1°	84°50.5'	+18.8'	112.0°	84°23.4'	+28.6'	121.5°	17
18	83°44.9'	-40.4'	49.6°	84°20.7'	-34.7'	57.3°	84°49.0'	-27.0'	66.6°	85°07.7'	-17.2'	77.4°	85°14.7'	-05.4'	89.2°	85°09.3'	+07.1'	101.1°	84°52.0'	+18.9'	112.1°	18
19	83°04.5'	-44.7'	43.1°	83°46.0'	-40.5'	49.4°	84°22.0'	-34.8'	57.1°	84°50.5'	-27.1'	66.4°	85°09.3'	-17.2'	77.3°	85°16.4'	-05.4'	89.2°	85°10.9'	+07.2'	101.1°	19
20	82°19.8'	-47.8'	37.9°	83°05.5'	-44.8'	42.9°	83°47.2'	-40.6'	49.2°	84°23.4'	-34.9'	56.9°	84°52.0'	-27.2'	66.3°	85°10.9'	-17.3'	77.2°	85°18.1'	-05.4'	89.1°	20
21	81°31.9'	-50.2'	33.5°	82°20.8'	-47.9'	37.7°	83°06.6'	-44.9'	42.7°	83°48.5'	-40.7'	49.0°	84°24.8'	-35.0'	56.7°	84°53.6'	-27.3'	6				

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

6° 354° LHA				Latitude SAME as Declination												6° 354° LHA									
Dec°	14			15			16			17			18			19			20			Dec°			
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°				
0	74°47.5'	+55.0'	156.5°	73°52.2'	+55.6'	157.9°	72°56.4'	+56.2'	159.1°	72°00.1'	+56.6'	160.2°	71°03.5'	+57.0'	161.2°	70°06.5'	+57.3'	162.1°	69°09.3'	+57.6'	162.9°	0			
1	75°42.6'	+54.3'	155.0°	74°47.9'	+55.1'	156.5°	73°52.5'	+55.7'	157.9°	72°56.7'	+56.2'	159.1°	72°00.4'	+56.6'	160.2°	71°03.8'	+57.0'	161.2°	70°06.8'	+57.3'	162.1°	1			
2	76°36.9'	+53.5'	153.2°	75°42.9'	+54.4'	155.0°	74°48.2'	+55.1'	156.5°	73°52.9'	+55.7'	157.9°	72°57.1'	+56.2'	159.1°	72°00.8'	+56.7'	160.2°	71°04.2'	+57.0'	161.2°	2			
3	77°30.4'	+52.4'	151.2°	76°37.3'	+53.5'	153.2°	75°43.3'	+54.4'	155.0°	74°48.6'	+55.2'	156.5°	73°53.3'	+55.8'	157.9°	72°57.5'	+56.3'	159.1°	72°01.2'	+56.7'	160.2°	3			
4	78°22.8'	+51.1'	148.8°	77°30.8'	+52.5'	151.2°	76°37.8'	+53.6'	153.2°	75°43.8'	+54.5'	155.0°	74°49.1'	+55.2'	156.5°	73°53.7'	+55.8'	157.9°	72°57.9'	+56.3'	159.1°	4			
5	79°13.9'	+49.5'	146.1°	78°23.3'	+51.2'	148.8°	77°31.4'	+52.6'	151.2°	76°38.3'	+53.7'	153.2°	75°44.3'	+54.5'	155.0°	74°49.6'	+55.3'	156.6°	73°54.2'	+55.9'	157.9°	5			
6	80°03.5'	+47.4'	143.0°	79°14.5'	+49.6'	146.2°	78°23.9'	+51.3'	148.9°	77°31.9'	+52.6'	151.2°	76°38.8'	+53.7'	153.2°	75°44.8'	+54.6'	155.0°	74°50.1'	+55.3'	156.6°	6			
7	80°50.9'	+44.8'	139.3°	80°04.1'	+47.5'	143.0°	79°15.2'	+49.7'	146.2°	78°24.6'	+51.4'	148.9°	77°32.5'	+52.7'	151.3°	76°39.4'	+53.8'	153.3°	75°45.4'	+54.7'	155.1°	7			
8	81°35.7'	+41.3'	134.9°	80°51.7'	+44.9'	139.3°	80°04.9'	+47.6'	143.1°	79°15.9'	+49.8'	146.2°	78°25.3'	+51.4'	149.0°	77°33.2'	+52.8'	151.3°	76°40.1'	+53.9'	153.3°	8			
9	82°17.0'	+36.9'	129.7°	81°36.5'	+41.5'	135.0°	80°52.5'	+45.0'	139.4°	80°05.7'	+47.7'	143.1°	79°16.7'	+49.9'	146.3°	78°26.0'	+51.5'	149.0°	77°33.9'	+52.9'	151.3°	9			
10	82°53.9'	+31.2'	123.6°	82°18.0'	+37.0'	129.8°	81°37.5'	+41.6'	135.0°	80°53.4'	+45.1'	139.4°	80°06.6'	+47.8'	143.2°	79°17.5'	+50.0'	146.4°	78°26.8'	+51.6'	149.1°	10			
11	83°25.2'	+24.1'	116.4°	82°55.1'	+31.4'	123.7°	82°19.1'	+37.2'	129.9°	81°38.5'	+41.7'	135.1°	80°54.4'	+45.2'	139.5°	80°07.5'	+47.9'	143.3°	79°18.4'	+50.1'	146.4°	11			
12	83°49.3'	+15.6'	108.2°	83°26.4'	+24.3'	116.5°	82°56.3'	+31.5'	123.7°	82°20.2'	+37.3'	129.9°	81°39.6'	+41.9'	135.2°	80°55.4'	+45.4'	139.6°	80°08.5'	+48.1'	143.3°	12			
13	84°04.9'	+05.8'	99.0°	83°50.7'	+15.7'	108.2°	83°27.8'	+24.4'	116.5°	82°57.6'	+31.7'	123.8°	82°21.5'	+37.5'	130.0°	81°40.8'	+42.0'	135.3°	80°56.5'	+45.5'	139.7°	13			
14	84°10.7'	-04.3'	89.3°	84°06.4'	+05.9'	99.0°	83°52.2'	+15.8'	108.2°	83°29.2'	+24.5'	116.6°	82°58.9'	+31.8'	123.9°	82°22.8'	+37.6'	130.1°	81°42.0'	+42.1'	135.4°	14			
15	84°06.4'	-14.2'	79.5°	84°12.3'	-04.3'	89.2°	84°08.0'	+06.0'	99.0°	83°53.8'	+15.9'	108.3°	83°30.8'	+24.7'	116.7°	83°00.4'	+32.0'	124.0°	82°24.2'	+37.8'	130.2°	15			
16	83°52.2'	-22.9'	70.2°	84°08.0'	-14.2'	79.4°	84°14.0'	-04.3'	89.2°	84°09.7'	+06.1'	99.0°	83°55.4'	+16.0'	108.3°	83°32.4'	+24.8'	116.7°	83°02.0'	+32.2'	124.1°	16			
17	83°29.2'	-30.3'	61.8°	83°53.8'	-23.0'	70.1°	84°09.7'	-14.2'	79.3°	84°15.7'	-04.3'	89.1°	84°11.5'	+06.2'	99.0°	83°57.2'	+16.2'	108.4°	83°34.1'	+25.0'	116.8°	17			
18	82°58.9'	-36.2'	54.5°	83°30.8'	-30.4'	61.6°	83°55.4'	-23.1'	69.9°	84°11.5'	-14.2'	79.2°	84°17.6'	-04.2'	89.1°	84°13.4'	+06.2'	99.0°	83°59.1'	+16.3'	108.4°	18			
19	82°22.8'	-40.8'	48.2°	83°00.4'	-36.2'	54.3°	83°32.4'	-30.4'	61.5°	83°57.2'	-23.1'	69.8°	84°13.4'	-14.3'	79.1°	84°19.6'	-04.2'	89.0°	84°15.4'	+06.3'	99.0°	19			
20	81°42.0'	-44.3'	42.9°	82°24.2'	-40.8'	48.0°	83°02.0'	-36.3'	54.1°	83°34.1'	-30.5'	61.3°	83°59.1'	-23.2'	69.6°	84°15.4'	-14.3'	79.0°	84°21.7'	-04.2'	89.0°	20			
21	80°57.7'	-47.1'	38.4°	81°43.3'	-44.4'	42.7°	82°25.6'	-40.9'	47.8°	83°03.6'	-36.4'	53.9°	83°35.9'	-30.6'	61.1°	84°01.1'	-23.3'	69.5°	84°17.5'	-14.4'	78.9°	21			
22	80°10.6'	-49.2'	34.6°	80°58.9'	-47.2'	38.2°	81°44.7'	-44.5'	42.5°	82°27.2'	-41.0'	47.6°	83°05.3'	-36.5'	53.6°	83°37.8'	-30.7'	60.9°	84°03.2'	-23.4'	69.3°	22			
23	79°21.4'	-50.9'	31.4°	80°11.8'	-49.3'	34.4°	81°00.2'	-47.2'	32.0°	81°46.2'	-44.6'	42.2°	82°28.8'	-41.1'	47.3°	83°07.1'	-36.6'	53.4°	83°39.8'	-30.8'	60.7°	23			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20						

6° 354° LHA Latitude SAME as Declination 6° 354° LHA
 South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

7° 353° LHA				Latitude SAME as Declination												7° 353° LHA						
Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	74°22.7'	+53.5'	153.1°	73°28.9'	+54.3'	154.6°	72°34.3'	+55.0'	156.0°	71°39.3'	+55.5'	157.2°	70°43.7'	+56.0'	158.3°	69°47.8'	+56.4'	159.3°	68°51.5'	+56.8'	160.3°	0
1	75°16.3'	+52.7'	151.4°	74°23.2'	+53.6'	153.1°	73°29.3'	+54.3'	154.6°	72°34.8'	+55.0'	156.0°	71°39.7'	+55.6'	157.2°	70°44.2'	+56.0'	158.3°	69°48.2'	+56.4'	159.3°	1
2	76°08.9'	+51.6'	149.4°	75°16.7'	+52.7'	151.4°	74°23.6'	+53.6'	153.1°	73°29.8'	+54.4'	154.6°	72°35.3'	+55.1'	156.0°	71°40.2'	+55.6'	157.2°	70°44.7'	+56.1'	158.3°	2
3	77°00.5'	+50.4'	147.2°	76°09.5'	+51.7'	149.4°	75°17.3'	+52.8'	151.4°	74°24.2'	+53.7'	153.1°	73°30.3'	+54.5'	154.6°	72°35.8'	+55.1'	156.0°	71°40.7'	+55.7'	157.2°	3
4	77°50.9'	+48.8'	144.7°	77°01.1'	+50.4'	147.2°	76°10.1'	+51.8'	149.4°	75°17.9'	+52.9'	151.4°	74°24.8'	+53.8'	153.1°	73°30.9'	+54.5'	154.6°	72°36.4'	+55.2'	156.0°	4
5	78°39.7'	+46.9'	141.9°	77°51.6'	+48.9'	144.7°	77°01.8'	+50.5'	147.3°	76°10.7'	+51.8'	149.5°	75°18.5'	+52.9'	151.4°	74°25.4'	+53.8'	153.1°	73°31.6'	+54.6'	154.7°	5
6	79°26.6'	+44.6'	138.6°	78°40.5'	+47.0'	141.9°	77°52.3'	+49.0'	144.8°	77°02.6'	+50.6'	147.3°	76°11.5'	+51.9'	149.5°	75°19.3'	+53.0'	151.4°	74°26.1'	+53.9'	153.1°	6
7	80°11.2'	+41.6'	134.8°	79°27.5'	+44.7'	138.6°	78°41.3'	+47.1'	141.9°	77°53.2'	+49.1'	144.8°	77°03.4'	+50.7'	147.3°	76°12.3'	+52.0'	149.5°	75°20.0'	+53.1'	151.5°	7
8	80°52.8'	+38.0'	130.4°	80°12.2'	+41.8'	134.8°	79°28.5'	+44.8'	138.7°	78°42.3'	+47.2'	142.0°	77°54.1'	+49.2'	144.8°	77°04.3'	+50.8'	147.4°	76°13.1'	+52.1'	149.6°	8
9	81°30.8'	+33.5'	125.3°	80°53.9'	+38.1'	130.4°	80°13.2'	+41.9'	134.9°	79°29.5'	+44.9'	138.7°	78°43.3'	+47.3'	142.0°	77°55.0'	+49.3'	144.9°	77°05.2'	+50.9'	147.4°	9
10	82°04.3'	+27.9'	119.5°	81°32.1'	+33.6'	125.4°	80°55.1'	+38.3'	130.5°	80°14.4'	+42.0'	134.9°	79°30.6'	+45.0'	138.8°	78°44.3'	+47.5'	142.1°	77°56.1'	+49.4'	145.0°	10
11	82°32.2'	+21.3'	112.9°	82°05.7'	+28.1'	119.6°	81°33.4'	+33.8'	125.4°	80°56.4'	+38.4'	130.6°	80°15.6'	+42.2'	135.0°	79°31.8'	+45.2'	138.8°	78°45.5'	+47.6'	142.1°	11
12	82°53.6'	+13.7'	105.5°	82°33.8'	+21.5'	112.9°	82°07.2'	+28.2'	119.6°	81°34.8'	+33.9'	125.5°	80°57.8'	+38.6'	130.6°	80°17.0'	+42.3'	135.1°	79°33.1'	+45.3'	138.9°	12
13	83°07.2'	+05.3'	97.5°	82°55.2'	+13.8'	105.5°	82°35.4'	+21.6'	113.0°	82°08.7'	+28.4'	119.7°	81°36.4'	+34.1'	125.6°	80°59.3'	+38.7'	130.7°	80°18.4'	+42.5'	135.2°	13
14	83°12.5'	-03.5'	89.2°	83°09.0'	+05.3'	97.5°	82°57.0'	+13.9'	105.6°	82°37.1'	+21.7'	113.0°	82°10.4'	+28.5'	119.7°	81°38.0'	+34.2'	125.6°	81°00.8'	+38.9'	130.8°	14
15	83°09.0'	-12.0'	80.7°	83°14.3'	-03.5'	89.1°	83°10.9'	+05.4'	97.5°	82°58.9'	+14.0'	105.6°	82°39.0'	+21.9'	113.1°	82°12.2'	+28.7'	119.8°	81°39.7'	+34.4'	125.7°	15
16	82°57.0'	-19.9'	72.6°	83°10.9'	-12.0'	80.6°	83°16.3'	-03.4'	89.0°	83°12.9'	+05.5'	97.5°	83°00.9'	+14.1'	105.6°	82°40.9'	+22.0'	113.1°	82°14.1'	+28.9'	119.9°	16
17	82°37.1'	-26.7'	65.1°	82°58.9'	-19.9'	72.5°	83°12.9'	-12.0'	80.5°	83°18.4'	-03.4'	89.0°	83°15.0'	+05.6'	97.5°	83°03.0'	+14.3'	105.6°	82°43.0'	+22.2'	113.2°	17
18	82°10.4'	-32.4'	58.3°	82°39.0'	-26.8'	64.9°	83°00.9'	-19.9'	72.4°	83°15.0'	-12.0'	80.4°	83°20.6'	-03.3'	88.9°	83°17.2'	+05.7'	97.4°	83°05.2'	+14.4'	105.7°	18
19	81°38.0'	-37.2'	52.4°	82°12.2'	-32.5'	58.2°	82°40.9'	-26.8'	64.8°	83°03.0'	-20.0'	72.2°	83°17.2'	-12.0'	80.3°	83°22.9'	-03.3'	88.9°	83°19.6'	+05.8'	97.4°	19
20	81°00.8'	-41.0'	47.2°	81°39.7'	-37.2'	52.2°	82°44.1'	-32.6'	58.0°	82°43.0'	-26.9'	64.6°	83°05.2'	-20.0'	72.1°	83°19.6'	-12.1'	80.2°	83°25.4'	-03.3'	88.8°	20
21	80°19.9'	-44.0'	42.6°	81°02.5'	-41.0'	46.9°	81°41.5'	-37.3'	51.9°	82°46.1'	-32.7'	57.7°	82°45.2'	-27.0'	64.4°	83°07.5'	-20.1'	71.9°	83°22.1'	-12.1'	80.1°	21
22	79°35.8'	-46.5'	38.7°	80°21.4'	-44.1'	42.4°</																

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

8° 352° LHA				Latitude SAME as Declination								8° 352° LHA													
Dec°	14			15			16			17			18			19			20			Dec°			
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°				
0	73°54.9'	+51.9'	149.8°	73°02.6'	+52.9'	151.5°	72°09.5'	+53.7'	153.0°	71°15.7'	+54.3'	154.3°	70°21.4'	+54.9'	155.5°	69°26.5'	+55.4'	156.7°	68°31.2'	+55.9'	157.7°	0			
1	74°46.8'	+50.9'	148.0°	73°55.5'	+52.0'	149.8°	73°03.2'	+52.9'	151.5°	72°10.1'	+53.7'	153.0°	71°16.3'	+54.4'	154.3°	70°21.9'	+55.0'	155.5°	69°27.1'	+55.5'	156.6°	1			
2	75°37.8'	+49.7'	145.9°	74°47.5'	+51.0'	148.0°	73°56.1'	+52.1'	149.8°	73°03.8'	+53.0'	151.5°	72°10.7'	+53.8'	153.0°	71°16.9'	+54.5'	154.3°	70°22.6'	+55.0'	155.5°	2			
3	76°27.5'	+48.2'	143.6°	75°38.5'	+49.8'	145.9°	74°48.2'	+51.1'	148.0°	73°56.8'	+52.1'	149.8°	73°04.5'	+53.1'	151.5°	72°11.4'	+53.8'	153.0°	71°17.6'	+54.5'	154.3°	3			
4	77°15.7'	+46.5'	141.0°	76°28.2'	+48.3'	143.6°	75°39.2'	+49.9'	145.9°	74°48.9'	+51.1'	148.0°	73°57.5'	+52.2'	149.8°	73°05.2'	+53.1'	151.5°	72°12.1'	+53.9'	153.0°	4			
5	78°02.2'	+44.4'	138.0°	77°16.6'	+46.6'	141.0°	76°29.1'	+48.4'	143.6°	75°40.1'	+50.0'	145.9°	74°49.7'	+51.2'	148.0°	73°58.3'	+52.3'	149.9°	73°06.0'	+53.2'	151.5°	5			
6	78°46.6'	+41.9'	134.7°	78°03.2'	+44.5'	138.0°	77°17.5'	+46.7'	141.0°	76°30.0'	+48.5'	143.6°	75°41.0'	+50.1'	146.0°	74°50.7'	+51.3'	148.0°	73°59.2'	+52.4'	149.9°	6			
7	79°28.5'	+38.8'	130.9°	78°47.7'	+42.0'	134.7°	78°04.2'	+44.6'	138.1°	77°18.6'	+46.8'	141.0°	76°31.0'	+48.6'	143.7°	75°42.0'	+50.2'	146.0°	74°51.6'	+51.4'	148.1°	7			
8	80°07.2'	+35.0'	126.6°	79°29.7'	+38.9'	130.9°	78°48.9'	+42.1'	134.7°	78°05.4'	+44.8'	138.1°	77°19.7'	+46.9'	141.1°	76°32.1'	+48.8'	143.7°	75°43.1'	+50.3'	146.0°	8			
9	80°42.3'	+30.6'	121.7°	80°08.6'	+35.2'	126.6°	79°31.0'	+39.0'	130.9°	78°50.1'	+42.2'	134.8°	78°06.6'	+44.9'	138.1°	77°20.9'	+47.1'	141.1°	76°33.3'	+48.9'	143.8°	9			
10	81°12.8'	+25.3'	116.2°	80°43.7'	+30.7'	121.7°	80°10.0'	+35.3'	126.6°	79°32.4'	+39.2'	131.0°	78°51.5'	+42.4'	134.8°	78°08.0'	+45.0'	138.2°	77°22.2'	+47.2'	141.2°	10			
11	81°38.1'	+19.1'	110.1°	81°14.4'	+25.4'	116.2°	80°45.3'	+30.9'	121.7°	80°11.6'	+35.5'	126.7°	79°33.9'	+39.3'	131.0°	78°53.0'	+42.5'	134.9°	78°09.4'	+45.2'	138.3°	11			
12	81°57.2'	+12.3'	103.5°	81°39.8'	+19.3'	110.1°	81°16.2'	+25.6'	116.2°	80°47.0'	+31.0'	121.8°	80°13.2'	+35.6'	126.7°	79°35.5'	+39.5'	131.1°	78°54.5'	+42.7'	135.0°	12			
13	82°09.4'	+04.8'	96.4°	81°59.1'	+12.4'	103.5°	81°41.7'	+19.4'	110.1°	81°18.0'	+25.7'	116.3°	80°48.9'	+31.2'	121.8°	80°15.0'	+35.8'	126.8°	79°37.2'	+39.7'	131.2°	13			
14	82°14.3'	-02.8'	89.0°	82°11.5'	+04.9'	96.3°	82°01.1'	+12.5'	103.5°	81°43.8'	+19.5'	110.2°	81°20.0'	+25.9'	116.3°	80°50.8'	+31.3'	121.9°	80°16.9'	+36.0'	126.9°	14			
15	82°11.5'	-10.3'	81.7°	82°16.4'	-02.8'	89.0°	82°13.6'	+05.0'	96.3°	82°03.3'	+12.6'	103.5°	81°45.9'	+19.7'	110.2°	81°22.2'	+26.0'	116.4°	80°52.9'	+31.5'	122.0°	15			
16	82°01.1'	-17.4'	74.5°	82°13.6'	-10.3'	81.6°	82°18.6'	-02.7'	88.9°	82°15.9'	+05.1'	96.3°	82°05.6'	+12.7'	103.5°	81°48.2'	+19.9'	110.2°	81°24.4'	+26.2'	116.5°	16			
17	81°43.8'	-23.7'	67.7°	82°03.3'	-17.4'	74.3°	82°15.9'	-10.3'	81.4°	82°21.0'	-02.7'	88.8°	82°18.3'	+05.2'	96.3°	82°08.0'	+12.9'	103.5°	81°50.6'	+20.0'	110.3°	17			
18	81°20.0'	-29.2'	61.5°	81°45.9'	-23.8'	67.5°	82°05.6'	-17.4'	74.2°	82°18.3'	-10.3'	81.3°	82°23.5'	-02.6'	88.8°	82°20.9'	+05.3'	96.2°	82°10.6'	+13.0'	103.5°	18			
19	80°50.8'	-33.9'	55.8°	81°22.2'	-29.3'	61.3°	81°48.2'	-23.8'	67.4°	82°08.0'	-17.4'	74.1°	82°20.9'	-10.3'	81.2°	82°26.2'	-02.6'	88.7°	82°23.6'	+05.4'	96.2°	19			
20	80°16.9'	-37.8'	50.8°	80°52.9'	-34.0'	55.6°	81°24.4'	-29.4'	61.1°	81°50.6'	-23.9'	67.2°	82°10.6'	-17.5'	73.9°	82°23.6'	-10.3'	81.1°	82°29.0'	-02.5'	88.6°	20			
21	79°39.0'	-41.1'	46.3°	80°18.9'	-37.9'	50.6°	80°55.0'	-34.1'	55.4°	81°26.7'	-29.4'	60.9°	81°53.1'	-17.5'	67.0°	82°13.3'	-17.5'	73.8°	82°26.5'	-10.3'	81.0°	21			
22	78°57.9'	-43.8'	42.4°	79°40.9'	-41.2'	46.1°	80°21.0'	-38.0'	50.3°	80°57.3'	-34.2'	55.2°	81°29.2'	-29.5'	60.7°	81°55.8'	-24.0'	66.8°	82°16.2'	-17.6'	73.6°	22			
23	78°14.2'	-46.0'	38.9°	78°59.8'	-43.8'	42.2°	79°43.0'	-41.3'	45.9°	80°23.2'	-38.1'	50.1°	80°59.7'	-34.3'	54.9°	81°31.8'	-29.6'	60.4°	81°58.6'	-24.1'	66.6°	23			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20						

8° 352° LHA Latitude SAME as Declination 8° 352° LHA
 South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

9° 351° LHA				Latitude SAME as Declination								9° 351° LHA										
Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	73°24.3'	+50.3'	146.8°	72°33.6'	+51.4'	148.5°	71°42.0'	+52.3'	150.1°	70°49.6'	+53.1'	151.6°	69°56.5'	+53.8'	152.9°	69°02.9'	+54.4'	154.1°	68°08.6'	+54.9'	155.2°	0
1	74°14.6'	+49.1'	144.8°	73°25.0'	+50.4'	146.8°	72°34.3'	+51.4'	148.5°	71°42.7'	+52.4'	150.1°	70°50.3'	+53.2'	151.5°	69°57.2'	+53.8'	152.9°	69°03.6'	+54.4'	154.0°	1
2	75°03.8'	+47.8'	142.7°	74°15.4'	+49.2'	144.8°	73°25.8'	+50.5'	146.8°	72°35.1'	+51.5'	148.5°	71°43.5'	+52.4'	150.1°	70°51.1'	+53.2'	151.5°	69°58.0'	+53.9'	152.8°	2
3	75°51.5'	+46.2'	140.3°	75°04.6'	+47.9'	142.7°	74°16.2'	+49.3'	144.8°	73°26.6'	+50.6'	146.8°	72°35.9'	+51.6'	148.5°	71°44.3'	+52.5'	150.1°	70°51.9'	+53.3'	151.5°	3
4	76°37.7'	+44.3'	137.6°	75°52.5'	+46.3'	140.2°	75°05.5'	+48.0'	142.7°	74°17.2'	+49.4'	144.8°	73°27.5'	+50.6'	146.8°	72°36.8'	+51.7'	148.5°	71°45.2'	+52.6'	150.1°	4
5	77°22.0'	+42.0'	134.6°	76°38.7'	+44.4'	137.6°	75°53.5'	+46.4'	140.3°	75°06.6'	+48.1'	142.7°	74°18.2'	+49.5'	144.8°	73°28.5'	+50.7'	146.8°	72°37.8'	+51.8'	148.5°	5
6	78°04.0'	+39.3'	131.2°	77°23.1'	+42.1'	134.6°	76°39.9'	+44.5'	137.6°	75°54.6'	+46.5'	140.3°	75°07.7'	+48.2'	142.7°	74°19.3'	+49.6'	144.9°	73°29.6'	+50.8'	146.8°	6
7	78°43.3'	+36.2'	127.4°	78°05.3'	+39.5'	131.2°	77°24.4'	+42.3'	134.6°	76°41.1'	+44.6'	137.6°	75°55.9'	+46.6'	140.3°	75°08.9'	+48.3'	142.7°	74°20.5'	+49.7'	144.9°	7
8	79°19.5'	+32.4'	123.3°	78°44.7'	+36.3'	127.5°	78°06.7'	+39.6'	131.2°	77°25.8'	+42.4'	134.6°	76°42.5'	+44.8'	137.6°	75°57.2'	+46.7'	140.3°	75°10.2'	+48.4'	142.8°	8
9	79°51.9'	+28.1'	118.6°	79°21.0'	+32.6'	123.3°	78°46.3'	+36.5'	127.5°	78°08.2'	+39.8'	131.3°	77°27.3'	+42.5'	134.7°	76°44.0'	+44.9'	137.7°	75°58.6'	+46.9'	140.4°	9
10	80°20.0'	+23.0'	113.4°	79°53.6'	+28.2'	118.6°	79°22.7'	+32.7'	123.3°	78°47.9'	+36.6'	127.5°	78°09.8'	+39.9'	131.3°	77°28.9'	+42.7'	134.7°	76°45.5'	+45.0'	137.7°	10
11	80°43.0'	+17.4'	107.8°	80°21.8'	+23.2'	113.5°	79°55.5'	+28.4'	118.6°	79°24.5'	+32.9'	123.3°	78°49.7'	+36.8'	127.6°	78°11.6'	+40.1'	131.4°	77°30.6'	+42.9'	134.8°	11
12	81°00.4'	+11.2'	101.8°	80°45.0'	+17.5'	107.8°	80°23.8'	+23.3'	113.5°	79°57.4'	+28.5'	118.7°	79°26.5'	+33.1'	123.4°	78°51.6'	+36.9'	127.6°	78°13.4'	+40.2'	131.4°	12
13	81°11.5'	+04.5'	95.5°	81°02.5'	+11.3'	101.8°	80°47.2'	+17.7'	107.8°	80°26.0'	+23.5'	113.5°	79°59.6'	+28.7'	118.7°	79°28.6'	+33.2'	123.4°	78°53.7'	+37.1'	127.7°	13
14	81°16.1'	-02.3'	88.9°	81°13.8'	+04.6'	95.4°	81°04.8'	+11.4'	101.8°	80°49.5'	+17.8'	107.8°	80°28.3'	+23.7'	113.5°	80°01.8'	+28.9'	118.7°	79°30.8'	+33.4'	123.5°	14
15	81°13.8'	-09.0'	82.3°	81°18.4'	-02.2'	88.8°	81°16.2'	+04.7'	95.4°	81°07.3'	+11.5'	101.7°	80°52.0'	+18.0'	107.9°	80°30.7'	+23.8'	113.6°	80°04.2'	+29.1'	118.8°	15
16	81°04.8'	-15.3'	75.9°	81°16.2'	-08.9'	82.2°	81°21.0'	-02.1'	88.8°	81°18.8'	+04.8'	95.3°	81°09.9'	+11.7'	101.7°	80°54.6'	+18.1'	107.9°	80°33.3'	+24.0'	113.6°	16
17	80°49.5'	-21.2'	69.8°	81°07.3'	-15.3'	75.8°	81°18.8'	-08.9'	82.1°	81°23.6'	-02.1'	88.7°	81°21.6'	+04.9'	95.3°	81°12.7'	+11.8'	101.7°	80°57.3'	+18.3'	107.9°	17
18	80°28.3'	-26.5'	64.0°	80°52.0'	-21.2'	69.6°	81°09.9'	-15.4'	75.6°	81°21.6'	-08.9'	82.0°	81°26.5'	-02.0'	88.6°	81°24.5'	+05.0'	95.2°	81°15.6'	+11.9'	101.7°	18
19	80°01.8'	-31.0'	58.7°	80°30.7'	-26.5'	63.8°	80°54.6'	-21.3'	69.4°	81°12.7'	-15.4'	75.5°	81°24.5'	-08.9'	81.9°	81°29.5'	-02.0'	88.5°	81°27.5'	+05.1'	95.2°	19
20	79°30.8'	-35.0'	53.9°	80°04.2'	-31.1'	58.5°	80°33.3'	-26.6'	63.6°	80°57.3'	-21.3'	69.2°	81°15.6'	-15.4'	75.3°	81°27.5'	-08.9'	81.8°	81°32.6'	-01.9'	88.5°	20
21	78°55.8'	-38.3'	49.5°	79°33.1'	-35.0'	53.6°	80°06.7'	-31.2'	58.3°	80°36.0'	-26.6'	63.4°	81°00.2'	-21.4'	69.1°	81°18.7'	-15.4'	75.2°	81°30.7'	-08.8'	81.7°	21
22	78°17.5'	-41.2'	45.6°	78°58.1'	-38.4'	49.3°																

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

10° 350° LHA

Latitude SAME as Declination

10° 350° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	72°51.2'	+48.7'	143.9°	72°02.2'	+49.9'	145.7°	71°12.1'	+50.9'	147.4°	70°21.1'	+51.8'	148.9°	69°29.4'	+52.6'	150.3°	68°36.9'	+53.3'	151.6°	67°43.9'	+53.9'	152.7°	0
1	73°39.9'	+47.4'	141.9°	72°52.0'	+48.7'	143.9°	72°03.0'	+49.9'	145.7°	71°12.9'	+51.0'	147.4°	70°22.0'	+51.9'	148.9°	69°30.2'	+52.7'	150.3°	68°37.8'	+53.4'	151.5°	1
2	74°27.2'	+45.9'	139.6°	73°40.8'	+47.5'	141.9°	72°52.9'	+48.8'	143.9°	72°03.9'	+50.0'	145.7°	71°13.8'	+51.1'	147.4°	70°22.9'	+52.0'	148.9°	69°31.1'	+52.8'	150.3°	2
3	75°13.1'	+44.1'	137.2°	74°28.2'	+46.0'	139.6°	73°41.8'	+47.6'	141.9°	72°53.9'	+48.9'	143.9°	72°04.9'	+50.1'	145.7°	71°14.9'	+51.2'	147.4°	70°23.9'	+52.1'	148.9°	3
4	75°57.3'	+42.1'	134.5°	75°14.2'	+44.3'	137.2°	74°29.3'	+46.1'	139.6°	73°42.9'	+47.7'	141.8°	72°55.0'	+49.1'	143.9°	72°06.0'	+50.2'	145.7°	71°16.0'	+51.3'	147.4°	4
5	76°39.4'	+39.8'	131.4°	75°58.5'	+42.2'	134.5°	75°15.4'	+44.4'	137.2°	74°30.6'	+46.2'	139.6°	73°44.1'	+47.8'	141.9°	72°56.3'	+49.2'	143.9°	72°07.2'	+50.3'	145.7°	5
6	77°19.1'	+37.0'	128.1°	76°40.7'	+39.9'	131.5°	75°59.8'	+42.4'	134.5°	75°16.8'	+44.5'	137.2°	74°31.9'	+46.3'	139.6°	73°45.4'	+47.9'	141.9°	72°57.6'	+49.3'	143.9°	6
7	77°56.2'	+33.8'	124.4°	77°20.6'	+37.2'	128.1°	76°42.2'	+40.0'	131.5°	76°01.3'	+42.5'	134.5°	75°18.2'	+44.7'	137.2°	74°33.3'	+46.5'	139.7°	73°46.9'	+48.0'	141.9°	7
8	78°30.0'	+30.2'	120.4°	77°57.8'	+34.0'	124.5°	77°22.3'	+37.3'	128.1°	76°43.8'	+40.2'	131.5°	76°02.9'	+42.7'	134.5°	75°19.8'	+44.8'	137.2°	74°34.9'	+46.6'	139.7°	8
9	79°00.1'	+25.9'	116.0°	78°31.8'	+30.3'	120.4°	77°59.6'	+34.1'	124.5°	77°24.0'	+37.5'	128.2°	76°45.6'	+40.4'	131.5°	76°04.6'	+42.8'	134.5°	75°21.5'	+44.9'	137.3°	9
10	79°26.1'	+21.2'	111.1°	79°02.1'	+26.1'	116.0°	78°33.7'	+30.5'	120.4°	78°01.5'	+34.3'	124.5°	77°25.9'	+37.6'	128.2°	76°47.4'	+40.5'	131.6°	76°06.5'	+43.0'	134.6°	10
11	79°47.3'	+16.0'	106.0°	79°28.2'	+21.4'	111.1°	79°04.2'	+26.3'	116.0°	78°35.8'	+30.6'	120.4°	78°03.6'	+34.5'	124.5°	77°28.0'	+37.8'	128.2°	76°49.4'	+40.7'	131.6°	11
12	80°03.3'	+10.3'	100.4°	79°49.6'	+16.1'	105.9°	79°30.5'	+21.5'	111.1°	79°06.5'	+26.4'	116.0°	78°38.1'	+30.8'	120.5°	78°05.8'	+34.7'	124.6°	77°30.1'	+38.0'	128.3°	12
13	80°13.5'	+04.3'	94.7°	80°05.7'	+10.4'	100.4°	79°52.0'	+16.3'	105.9°	79°32.9'	+21.7'	111.1°	79°08.9'	+26.6'	116.0°	78°40.4'	+31.0'	120.5°	78°08.1'	+34.8'	124.6°	13
14	80°17.9'	-01.8'	88.8°	80°16.1'	+04.4'	94.6°	80°08.2'	+10.5'	100.4°	79°54.6'	+16.4'	105.9°	79°35.5'	+21.9'	111.2°	79°11.4'	+26.8'	116.0°	78°43.0'	+31.2'	120.6°	14
15	80°16.1'	-07.8'	82.9°	80°20.5'	-01.7'	88.7°	80°18.8'	+04.5'	94.6°	80°11.0'	+10.7'	100.3°	79°57.3'	+16.6'	105.9°	79°38.2'	+22.0'	111.2°	79°14.2'	+27.0'	116.1°	15
16	80°08.2'	-13.7'	77.0°	80°18.8'	-07.8'	82.8°	80°23.3'	-01.6'	88.6°	80°21.7'	+04.6'	94.5°	80°13.9'	+10.8'	100.3°	80°00.3'	+16.7'	105.9°	79°41.2'	+22.2'	111.2°	16
17	79°54.6'	-19.1'	71.4°	80°11.0'	-13.6'	76.9°	80°21.7'	-07.8'	82.6°	80°26.3'	-01.6'	88.5°	80°24.7'	+04.7'	94.5°	80°17.0'	+10.9'	100.3°	80°03.4'	+16.9'	105.9°	17
18	79°35.5'	-24.0'	66.1°	79°57.3'	-19.1'	71.2°	80°13.9'	-13.6'	76.8°	80°24.7'	-07.7'	82.5°	80°29.4'	-01.5'	88.5°	80°27.9'	+04.8'	94.4°	80°20.2'	+11.1'	100.3°	18
19	79°11.4'	-28.5'	61.1°	79°38.2'	-24.1'	65.9°	80°00.3'	-19.1'	71.1°	80°17.0'	-13.6'	76.6°	80°27.9'	-07.7'	82.4°	80°32.8'	-01.4'	88.4°	80°31.3'	+04.9'	94.4°	19
20	78°43.0'	-32.4'	56.5°	79°14.2'	-28.5'	60.9°	79°41.2'	-24.1'	65.7°	80°03.4'	-19.1'	70.9°	80°20.2'	-13.6'	76.5°	80°31.3'	-07.7'	82.3°	80°36.3'	-01.4'	88.3°	20
21	78°10.6'	-35.8'	52.3°	78°45.6'	-32.4'	56.3°	79°17.0'	-28.6'	60.7°	79°44.2'	-24.2'	65.5°	80°06.6'	-19.2'	70.7°	80°23.7'	-13.6'	76.3°	80°34.9'	-07.6'	82.2°	21
22	77°34.9'	-38.7'	48.5°	78°13.2'	-35.8'	52.1°	78°48.5'	-32.5'	56.0°	79°20.1'	-28.6'	60.5°	79°47.5'	-24.2'	65.3°	80°10.0'	-19.2'	70.5°	80°27.3'	-13.6'	76.1°	22
23	76°56.2'	-41.2'	45.0°	77°37.4'	-38.7'	48.2°	78°16.0'	-35.9'	51.8°	78°51.4'	-32.6'	55.8°	79°23.2'	-28.7'	60.2°	79°50.8'	-24.3'	65.1°	80°13.6'	-19.3'	70.3°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

10° 350° LHA

Latitude SAME as Declination

10° 350° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

11° 349° LHA

Latitude SAME as Declination

11° 349° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	72°15.8'	+47.0'	141.2°	71°28.4'	+48.3'	143.1°	70°39.9'	+49.5'	144.8°	69°50.4'	+50.5'	146.4°	69°00.0'	+51.4'	147.8°	68°08.9'	+52.2'	149.2°	67°17.0'	+52.9'	150.4°	0
1	73°02.8'	+45.6'	139.1°	72°16.8'	+47.1'	141.2°	71°29.4'	+48.4'	143.1°	70°40.9'	+49.6'	144.8°	69°51.4'	+50.6'	146.4°	69°01.0'	+51.5'	147.8°	68°09.9'	+52.3'	149.1°	1
2	73°48.5'	+44.0'	136.9°	73°03.9'	+45.7'	139.1°	72°17.8'	+47.2'	141.2°	71°30.5'	+48.5'	143.0°	70°42.0'	+49.7'	144.8°	69°52.5'	+50.7'	146.3°	69°02.1'	+51.6'	147.8°	2
3	74°32.5'	+42.2'	134.4°	73°49.6'	+44.2'	136.8°	73°05.0'	+45.9'	139.1°	72°19.0'	+47.3'	141.1°	71°31.7'	+48.6'	143.0°	70°43.2'	+49.8'	144.8°	69°53.7'	+50.8'	146.3°	3
4	75°14.7'	+40.1'	131.6°	74°33.8'	+42.3'	134.3°	73°50.9'	+44.3'	136.8°	73°06.3'	+46.0'	139.1°	72°20.3'	+47.5'	141.1°	71°33.0'	+48.8'	143.0°	70°44.5'	+49.9'	144.8°	4
5	75°54.8'	+37.7'	128.6°	75°16.1'	+40.2'	131.6°	74°35.2'	+42.5'	134.3°	73°52.3'	+44.4'	136.8°	73°07.8'	+46.1'	139.1°	72°21.7'	+47.6'	141.1°	71°34.4'	+48.9'	143.0°	5
6	76°32.5'	+34.9'	125.4°	75°56.4'	+37.8'	128.6°	75°17.7'	+40.4'	131.6°	74°36.8'	+42.6'	134.3°	73°53.9'	+44.6'	136.8°	73°09.3'	+46.3'	139.1°	72°23.3'	+47.7'	141.2°	6
7	77°07.4'	+31.7'	121.8°	76°34.2'	+35.1'	125.4°	75°58.1'	+38.0'	128.6°	75°19.4'	+40.5'	131.6°	74°38.4'	+42.8'	134.4°	73°55.6'	+44.7'	136.8°	73°11.0'	+46.4'	139.1°	7
8	77°39.1'	+28.2'	117.9°	77°09.3'	+31.9'	121.8°	76°36.0'	+35.2'	125.4°	76°00.0'	+38.1'	128.7°	75°21.2'	+40.7'	131.6°	74°40.3'	+42.9'	134.4°	73°57.4'	+44.9'	136.9°	8
9	78°07.3'	+24.1'	113.7°	77°41.2'	+28.3'	117.9°	77°11.3'	+32.1'	121.8°	76°38.1'	+35.4'	125.4°	76°01.9'	+38.3'	128.7°	75°23.2'	+40.9'	131.7°	74°42.2'	+43.1'	134.4°	9
10	78°31.4'	+19.7'	109.2°	78°09.5'	+24.3'	113.7°	77°43.3'	+28.5'	117.9°	77°13.5'	+32.3'	121.8°	76°40.2'	+35.6'	125.4°	76°04.1'	+38.5'	128.7°	75°25.3'	+41.0'	131.7°	10
11	78°51.1'	+14.8'	104.4°	78°33.8'	+19.8'	109.2°	78°11.8'	+24.5'	113.7°	77°45.7'	+28.7'	117.9°	77°15.8'	+32.4'	121.8°	76°42.5'	+35.8'	125.4°	76°06.3'	+38.7'	128.7°	11
12	79°05.9'	+09.6'	99.3°	78°53.6'	+14.9'	104.3°	78°36.3'	+20.0'	109.1°	78°14.4'	+24.6'	113.7°	77°48.2'	+28.9'	117.9°	77°18.3'	+32.6'	121.9°	76°45.0'	+35.9'	125.5°	12
13	79°15.5'	+04.2'	94.0°	79°08.6'	+09.7'	99.2°	78°56.3'	+15.1'	104.3°	78°39.0'	+20.2'	109.1°	78°17.1'	+24.8'	113.7°	77°50.9'	+29.0'	118.0°	77°21.0'	+32.8'	121.9°	13
14	79°19.7'	-01.4'	88.7°	79°18.3'	+04.3'	94.0°	79°11.4'	+09.9'	99.2°	78°59.2'	+15.3'	104.3°	78°41.9'	+20.3'	109.1°	78°20.0'	+25.0'	113.7°	77°53.8'	+29.2'	118.0°	14
15	79°18.3'	-06.9'	83.3°	79°22.6'	-01.3'	88.6°	79°21.3'	+04.4'	93.9°	79°14.4'	+10.0'	99.2°	79°02.2'	+15.4'	104.3°	78°45.0'	+20.5'	109.1°	78°23.0'	+25.2'	113.7°	15
16	79°11.4'	-12.2'	77.9°	79°21.3'	-06.8'	83.2°	79°25.6'	-01.2'	88.5°	79°24.4'	+04.5'	93.8°	79°17.7'	+10.1'	99.1°	79°05.5'	+15.6'	104.3°	78°48.2'	+20.7'	109.2°	16
17	78°59.2'	-17.3'	72.8°	79°14.4'	-12.2'	77.8°	79°24.4'	-06.8'	83.0°	79°28.9'	-01.1'	88.4°	79°27.8'	+04.6'	93.8°	79°21.1'	+10.3'	99.1°	79°08.9'	+15.7'	104.2°	17
18	78°41.9'	-21.9'	67.8°	79°02.2'	-17.3'	72.6°	79°17.7'	-12.2'	77.7°	79°27.8'	-06.7'	82.9°	79°32.4'	-01.1'	88.3°	79°31.3'	+04.7'	93.7°	79°24.7'	+10.4'	99.1°	18
19	78°20.0'	-26.2'	63.1°	78°45.0'	-22.0'	67.6°	79°05.5'	-17.3'	72.4°	79°21.1'	-12.1'	77.5°	79°31.3'	-06.7'	82.8°	79°36.1'	-01.0'	88.2°	79°35.1'	+04.8'	93.7°	19
20	77°53.8'	-30.0'	58.8°	78°23.0'	-26.2'	62.9°	78°48.2'	-22.0'	67.4°	79°08.9'	-17.3'	72.3°	79°24.7'	-12.1'	77.4°	79°35.1'	-06.6'	82.7°	79°39.9'	-00.9'	88.1°	20
21	77°23.8'	-33.4'																				

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

12° 348° LHA

Latitude SAME as Declination

12° 348° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	71°38.4'	+45.4'	138.7°	70°52.6'	+46.8'	140.6°	70°05.7'	+48.1'	142.4°	69°17.6'	+49.2'	144.0°	68°28.7'	+50.1'	145.5°	67°38.8'	+51.0'	146.9°	66°48.2'	+51.8'	148.1°	0
1	72°23.8'	+43.9'	136.6°	71°39.4'	+45.5'	138.7°	70°53.7'	+46.9'	140.6°	70°06.8'	+48.2'	142.3°	69°18.8'	+49.3'	144.0°	68°29.8'	+50.2'	145.5°	67°40.0'	+51.1'	146.8°	1
2	73°07.7'	+42.3'	134.3°	72°25.0'	+44.1'	136.5°	71°40.7'	+45.6'	138.6°	70°55.0'	+47.0'	140.5°	70°08.1'	+48.3'	142.3°	69°20.1'	+49.4'	143.9°	68°31.1'	+50.4'	145.4°	2
3	73°50.0'	+40.4'	131.8°	73°09.0'	+42.4'	134.3°	72°26.3'	+44.2'	136.5°	71°42.0'	+45.8'	138.6°	70°56.3'	+47.2'	140.5°	70°09.4'	+48.4'	142.3°	69°21.5'	+49.5'	143.9°	3
4	74°30.3'	+38.2'	129.1°	73°51.4'	+40.5'	131.8°	73°10.5'	+42.5'	134.2°	72°27.8'	+44.3'	136.5°	71°43.5'	+45.9'	138.6°	70°57.8'	+47.3'	140.5°	70°10.9'	+48.5'	142.3°	4
5	75°08.5'	+35.8'	126.1°	74°31.9'	+38.4'	129.0°	73°53.0'	+40.7'	131.7°	73°12.1'	+42.7'	134.2°	72°29.4'	+44.5'	136.5°	71°45.1'	+46.0'	138.6°	70°59.5'	+47.4'	140.5°	5
6	75°44.3'	+33.0'	122.9°	75°10.3'	+35.9'	126.1°	74°33.7'	+38.5'	129.0°	73°54.8'	+40.8'	131.7°	73°13.9'	+42.8'	134.2°	72°31.2'	+44.6'	136.5°	71°46.9'	+46.2'	138.6°	6
7	76°17.3'	+29.9'	119.5°	75°46.2'	+33.2'	122.9°	75°12.2'	+36.1'	126.1°	74°35.6'	+38.7'	129.0°	73°56.7'	+41.0'	131.7°	73°15.8'	+43.0'	134.2°	72°33.1'	+44.8'	136.5°	7
8	76°47.2'	+26.4'	115.7°	76°19.4'	+30.1'	119.5°	75°48.3'	+33.3'	122.9°	75°14.3'	+36.3'	126.1°	74°37.7'	+38.9'	129.0°	73°58.8'	+41.1'	131.8°	73°17.9'	+43.2'	134.2°	8
9	77°13.6'	+22.6'	111.8°	76°49.4'	+26.6'	115.7°	76°21.6'	+30.2'	119.4°	75°50.6'	+33.5'	122.9°	75°16.6'	+36.4'	126.1°	74°40.0'	+39.0'	129.1°	74°01.0'	+41.3'	131.8°	9
10	77°36.2'	+18.4'	107.5°	77°16.0'	+22.7'	111.7°	76°51.9'	+26.8'	115.7°	76°24.1'	+30.4'	119.4°	75°53.0'	+33.7'	122.9°	75°19.0'	+36.6'	126.1°	74°42.4'	+39.2'	129.1°	10
11	77°54.5'	+13.8'	103.0°	77°38.8'	+18.5'	107.5°	77°18.6'	+22.9'	111.7°	76°54.5'	+26.9'	115.7°	76°26.7'	+30.6'	119.5°	75°55.6'	+33.9'	122.9°	75°21.6'	+36.8'	126.1°	11
12	78°08.4'	+09.0'	98.3°	77°57.3'	+14.0'	103.0°	77°41.5'	+18.7'	107.4°	77°21.4'	+23.1'	111.7°	76°57.3'	+27.1'	115.7°	76°29.5'	+30.8'	119.5°	75°58.4'	+34.1'	123.0°	12
13	78°17.4'	+04.1'	93.5°	78°11.3'	+09.2'	98.3°	78°00.2'	+14.1'	102.9°	77°44.5'	+18.9'	107.4°	77°24.4'	+23.3'	111.7°	77°00.3'	+27.3'	115.7°	76°32.5'	+31.0'	119.5°	13
14	78°21.5'	-01.0'	88.5°	78°20.4'	+04.2'	93.4°	78°14.4'	+09.3'	98.2°	78°03.4'	+14.3'	102.9°	77°47.7'	+19.0'	107.4°	77°27.6'	+23.5'	111.7°	77°03.5'	+27.5'	115.7°	14
15	78°20.4'	-06.1'	83.6°	78°24.6'	-00.9'	88.4°	78°23.7'	+04.3'	93.3°	78°17.7'	+09.5'	98.1°	78°06.8'	+14.5'	102.9°	77°51.1'	+19.2'	107.4°	77°31.0'	+23.7'	111.7°	15
16	78°14.4'	-11.0'	78.7°	78°23.7'	-06.0'	83.5°	78°28.0'	-00.8'	88.3°	78°27.2'	+04.4'	93.2°	78°21.2'	+09.6'	98.1°	78°10.3'	+14.6'	102.8°	77°54.7'	+19.4'	107.4°	16
17	78°03.4'	-15.7'	73.9°	78°17.7'	-10.9'	78.5°	78°27.2'	-05.9'	83.3°	78°31.6'	-00.7'	88.2°	78°30.8'	+04.5'	93.2°	78°25.0'	+09.7'	98.0°	78°14.1'	+14.8'	102.8°	17
18	77°47.7'	-20.1'	69.3°	78°06.8'	-15.7'	73.7°	78°21.2'	-10.9'	78.4°	78°30.8'	-05.9'	83.2°	78°35.4'	-00.6'	88.1°	78°34.7'	+04.6'	93.1°	78°28.9'	+09.9'	98.0°	18
19	77°27.6'	-24.1'	64.9°	77°51.1'	-20.1'	69.1°	78°10.3'	-15.6'	73.6°	78°25.0'	-10.9'	78.2°	78°34.7'	-05.8'	83.1°	78°39.4'	-00.6'	88.0°	78°38.8'	+04.8'	93.0°	19
20	77°03.5'	-27.8'	60.7°	77°31.0'	-24.2'	64.7°	77°54.7'	-20.1'	68.9°	78°14.1'	-15.6'	73.4°	78°28.9'	-10.8'	78.1°	78°38.8'	-05.7'	83.0°	78°43.6'	-00.5'	87.9°	20
21	76°35.6'	-31.2'	56.8°	77°06.8'	-27.9'	60.5°	77°34.6'	-24.2'	64.5°	77°58.5'	-20.1'	68.7°	78°18.1'	-15.6'	73.2°	78°33.1'	-10.8'	77.9°	78°43.1'	-05.7'	82.8°	21
22	76°04.5'	-34.1'	53.2°	76°39.0'	-31.2'	56.6°	77°10.4'	-27.9'	60.3°	77°38.3'	-24.2'	64.2°	78°02.4'	-20.1'	68.5°	78°22.2'	-15.6'	73.0°	78°37.4'	-10.8'	77.8°	22
23	75°30.3'	-36.8'	49.9°	76°07.7'	-34.2'	53.0°	76°42.5'	-31.3'	56.3°	77°14.1'	-28.0'	60.0°	77°42.3'	-24.3'	64.0°	78°06.6'	-20.2'	68.3°	78°26.6'	-15.7'	72.8°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

12° 348° LHA

Latitude SAME as Declination

12° 348° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

13° 347° LHA

Latitude SAME as Declination

13° 347° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	70°59.0'	+43.8'	136.3°	70°14.9'	+45.3'	138.3°	69°29.5'	+46.7'	140.1°	68°43.0'	+47.8'	141.7°	67°55.4'	+48.9'	143.2°	67°06.9'	+49.8'	144.7°	66°17.5'	+50.7'	146.0°	0
1	71°42.9'	+42.3'	134.2°	71°00.3'	+44.0'	136.3°	70°16.2'	+45.5'	138.2°	69°30.8'	+46.8'	140.0°	68°44.3'	+48.0'	141.7°	67°56.7'	+49.0'	143.2°	67°08.2'	+50.0'	144.6°	1
2	72°25.2'	+40.6'	131.9°	71°44.2'	+42.4'	134.2°	71°01.6'	+44.1'	136.3°	70°17.6'	+45.6'	138.2°	69°32.2'	+46.9'	140.0°	68°45.7'	+48.1'	141.6°	67°58.2'	+49.1'	143.2°	2
3	73°05.8'	+38.6'	129.4°	72°26.7'	+40.7'	131.9°	71°45.7'	+42.6'	134.1°	71°03.2'	+44.2'	136.2°	70°19.2'	+45.7'	138.2°	69°33.8'	+47.0'	140.0°	68°47.3'	+48.2'	141.6°	3
4	73°44.4'	+36.4'	126.7°	73°07.4'	+38.8'	129.4°	72°28.3'	+40.9'	131.8°	71°47.4'	+42.7'	134.1°	71°04.9'	+44.4'	136.2°	70°20.9'	+45.9'	138.1°	69°35.5'	+47.2'	139.9°	4
5	74°20.8'	+34.0'	123.8°	73°46.2'	+36.6'	126.7°	73°09.2'	+38.9'	129.4°	72°30.2'	+41.0'	131.8°	71°49.3'	+42.9'	134.1°	71°06.7'	+44.5'	136.2°	70°22.7'	+46.0'	138.1°	5
6	74°54.8'	+31.3'	120.7°	74°22.8'	+34.2'	123.8°	73°48.1'	+36.8'	126.7°	73°11.2'	+39.1'	129.3°	72°32.2'	+41.2'	131.8°	71°51.3'	+43.1'	134.1°	71°08.7'	+44.7'	136.2°	6
7	75°26.1'	+28.2'	117.4°	74°57.0'	+31.4'	120.7°	74°24.9'	+34.3'	123.8°	73°50.3'	+37.0'	126.7°	73°13.4'	+39.3'	129.3°	72°34.3'	+41.4'	131.8°	71°53.4'	+43.2'	134.1°	7
8	75°54.3'	+24.9'	113.8°	75°28.4'	+28.4'	117.4°	74°59.3'	+31.6'	120.7°	74°27.3'	+34.5'	123.8°	73°52.6'	+37.1'	126.7°	73°15.7'	+39.5'	129.3°	72°36.7'	+41.5'	131.8°	8
9	76°19.2'	+21.2'	110.0°	75°56.8'	+25.1'	113.8°	75°30.9'	+28.6'	117.3°	75°01.8'	+31.8'	120.7°	74°29.8'	+34.7'	123.8°	73°55.2'	+37.3'	126.7°	73°18.2'	+39.7'	129.3°	9
10	76°40.4'	+17.3'	106.0°	76°21.9'	+21.4'	110.0°	75°59.5'	+25.2'	113.8°	75°33.6'	+28.8'	117.3°	75°04.5'	+32.0'	120.7°	74°32.5'	+34.9'	123.8°	73°57.9'	+37.5'	126.7°	10
11	76°57.7'	+13.0'	101.8°	76°43.2'	+17.4'	106.0°	76°24.7'	+21.6'	110.0°	76°02.4'	+25.4'	113.8°	75°36.5'	+29.0'	117.3°	75°07.4'	+32.2'	120.7°	74°35.4'	+35.1'	123.8°	11
12	77°10.7'	+08.6'	97.5°	77°00.7'	+13.2'	101.8°	76°46.3'	+17.6'	105.9°	76°27.8'	+21.8'	109.9°	76°05.5'	+25.6'	113.7°	75°39.6'	+29.2'	117.3°	75°10.5'	+32.4'	120.7°	12
13	77°19.3'	+04.0'	93.0°	77°13.9'	+08.7'	97.4°	77°03.9'	+13.3'	101.7°	76°49.6'	+17.8'	105.9°	76°31.1'	+21.9'	109.9°	76°08.8'	+25.8'	113.7°	75°42.9'	+29.4'	117.3°	13
14	77°23.3'	-00.7'	88.4°	77°22.6'	+04.1'	92.9°	77°17.2'	+08.9'	97.3°	77°07.3'	+13.5'	101.7°	76°53.0'	+18.0'	105.9°	76°34.6'	+22.1'	109.9°	76°12.3'	+26.0'	113.7°	14
15	77°22.6'	-05.3'	83.8°	77°26.7'	-00.6'	88.3°	77°26.1'	+04.2'	92.8°	77°20.8'	+09.0'	97.3°	77°11.0'	+13.7'	101.6°	76°56.7'	+18.1'	105.9°	76°38.3'	+22.3'	109.9°	15
16	77°17.2'	-09.9'	79.3°	77°26.1'	-05.3'	83.7°	77°30.3'	-00.5'	88.2°	77°29.9'	+04.4'	92.7°	77°24.7'	+09.2'	97.2°	77°14.9'	+13.9'	101.6°	77°00.7'	+18.3'	105.8°	16
17	77°07.3'	-14.3'	74.8°	77°20.8'	-09.8'	79.1°	77°29.9'	-05.2'	83.6°	77°34.2'	-00.4'	88.1°	77°33.8'	+04.5'	92.6°	77°28.7'	+09.3'	97.1°	77°19.0'	+14.0'	101.5°	17
18	76°53.0'	-18.4'	70.5°	77°11.0'	-14.3'	74.7°	77°24.7'	-09.8'	79.0°	77°33.8'	-05.1'	83.4°	77°38.3'	-00.3'	88.0°	77°38.1'	+04.6'	92.5°	77°33.0'	+09.5'	97.1°	18
19	76°34.6'	-22.3'	66.4°	76°56.7'	-18.4'	70.3°	77°14.9'	-14.2'	74.5°	77°28.7'	-09.7'	78.8°	77°38.1'	-05.0'	83.3°	77°42.7'	-00.2'	87.9°	77°42.5'	+04.7'	92.5°	19
20	76°12.3'	-25.9'	62.4°	76°38.3'	-22.3'	66.2°	77°00.7'	-18.4'	70.1°	77°19.0'	-14.2'	74.3°	77°33.0'	-09.7'	78.7°	77°42.5'	-05.0'	83.2°	77°47.2'	-00.1'	87.8°	20
21	75°46.4'	-29.2'	58.7																			

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

14° 346° LHA

Latitude SAME as Declination

14° 346° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	70°18.0'	+42.3'	134.1°	69°35.5'	+43.9'	136.1°	68°51.7'	+45.3'	137.9°	68°06.6'	+46.5'	139.5°	67°20.4'	+47.7'	141.1°	66°33.2'	+48.7'	142.6°	65°45.1'	+49.6'	143.9°	0
1	71°00.4'	+40.7'	132.0°	70°19.4'	+42.5'	134.1°	69°36.9'	+44.0'	136.0°	68°53.1'	+45.4'	137.8°	68°08.1'	+46.7'	139.5°	67°21.9'	+47.8'	141.1°	66°34.7'	+48.8'	142.5°	1
2	71°41.1'	+39.0'	129.7°	71°01.9'	+40.9'	131.9°	70°21.0'	+42.6'	134.0°	69°38.5'	+44.2'	136.0°	68°54.7'	+45.6'	137.8°	68°09.7'	+46.8'	139.5°	67°23.6'	+47.9'	141.0°	2
3	72°20.1'	+37.0'	127.2°	71°42.8'	+39.1'	129.7°	71°03.6'	+41.0'	131.9°	70°22.7'	+42.8'	134.0°	69°40.3'	+44.3'	135.9°	68°56.5'	+45.7'	137.8°	68°11.5'	+46.9'	139.4°	3
4	72°57.1'	+34.8'	124.6°	72°21.9'	+37.2'	127.2°	71°44.6'	+39.3'	129.6°	71°05.4'	+41.2'	131.9°	70°24.6'	+42.9'	134.0°	69°42.2'	+44.5'	135.9°	68°58.4'	+45.9'	137.7°	4
5	73°31.9'	+32.4'	121.8°	72°59.1'	+35.0'	124.6°	72°23.9'	+37.3'	127.2°	71°46.7'	+39.5'	129.6°	71°07.5'	+41.4'	131.8°	70°26.7'	+43.1'	133.9°	69°44.3'	+44.6'	135.9°	5
6	74°04.3'	+29.7'	118.8°	73°34.0'	+32.6'	121.7°	73°01.2'	+35.2'	124.5°	72°26.1'	+37.5'	127.1°	71°48.9'	+39.6'	129.6°	71°09.7'	+41.5'	131.8°	70°28.9'	+43.3'	133.9°	6
7	74°34.0'	+26.7'	115.5°	74°06.6'	+29.9'	118.7°	73°36.4'	+32.7'	121.7°	73°03.6'	+35.3'	124.5°	72°28.5'	+37.7'	127.1°	71°51.3'	+39.8'	129.6°	71°12.2'	+41.7'	131.8°	7
8	75°00.7'	+23.5'	112.1°	74°36.5'	+26.9'	115.5°	74°09.2'	+30.1'	118.7°	73°39.0'	+32.9'	121.7°	73°06.2'	+35.5'	124.5°	72°31.1'	+37.9'	127.1°	71°53.9'	+40.0'	129.6°	8
9	75°24.3'	+20.0'	108.5°	75°03.4'	+23.7'	112.1°	74°39.2'	+27.1'	115.5°	74°11.9'	+30.3'	118.7°	73°41.8'	+33.1'	121.7°	73°09.0'	+35.7'	124.5°	72°33.9'	+38.1'	127.1°	9
10	75°44.3'	+16.3'	104.7°	75°27.1'	+20.2'	108.5°	75°06.3'	+23.9'	112.0°	74°42.2'	+27.3'	115.4°	74°14.9'	+30.5'	118.6°	73°44.7'	+33.3'	121.7°	73°12.0'	+35.9'	124.5°	10
11	76°00.6'	+12.3'	100.8°	75°47.4'	+16.5'	104.7°	75°30.2'	+20.4'	108.4°	75°09.5'	+24.1'	112.0°	74°45.4'	+27.5'	115.4°	74°18.1'	+30.7'	118.6°	73°47.9'	+33.5'	121.7°	11
12	76°12.9'	+08.2'	96.7°	76°03.8'	+12.5'	100.7°	75°50.7'	+16.7'	104.6°	75°33.6'	+20.6'	108.4°	75°12.9'	+24.3'	112.0°	74°48.8'	+27.7'	115.4°	74°21.5'	+30.9'	118.6°	12
13	76°21.1'	+03.9'	92.5°	76°16.3'	+08.4'	96.6°	76°07.3'	+12.7'	100.7°	75°54.2'	+16.8'	104.6°	75°37.2'	+20.8'	108.4°	75°16.5'	+24.5'	112.0°	74°52.4'	+27.9'	115.4°	13
14	76°25.1'	-00.4'	88.3°	76°24.7'	+04.1'	92.4°	76°20.0'	+08.5'	96.6°	76°11.0'	+12.8'	100.6°	75°58.0'	+17.0'	104.5°	75°41.0'	+21.0'	108.3°	75°20.3'	+24.7'	112.0°	14
15	76°24.7'	-04.7'	84.0°	76°28.8'	-00.3'	88.2°	76°28.5'	+04.2'	92.3°	76°23.9'	+08.7'	96.5°	76°15.0'	+13.0'	100.5°	76°02.0'	+17.2'	104.5°	75°45.0'	+21.2'	108.3°	15
16	76°20.0'	-08.9'	79.8°	76°28.5'	-04.6'	83.9°	76°32.7'	-00.2'	88.1°	76°32.5'	+04.3'	92.2°	76°28.0'	+08.8'	96.4°	76°19.2'	+13.2'	100.5°	76°06.2'	+17.4'	104.5°	16
17	76°11.0'	-13.1'	75.6°	76°23.9'	-08.9'	79.7°	76°32.5'	-04.5'	83.8°	76°36.9'	00.0'	87.9°	76°36.8'	+04.5'	92.1°	76°32.4'	+09.0'	96.3°	76°23.6'	+13.4'	100.4°	17
18	75°58.0'	-17.0'	71.6°	76°15.0'	-13.0'	75.5°	76°28.0'	-08.8'	79.5°	76°36.8'	-04.4'	83.6°	76°41.3'	+00.1'	87.8°	76°41.4'	+04.6'	92.1°	76°37.0'	+09.1'	96.3°	18
19	75°41.0'	-20.7'	67.7°	76°02.0'	-17.0'	71.4°	76°19.2'	-13.0'	75.3°	76°32.4'	-08.8'	79.3°	76°41.4'	-04.4'	83.5°	76°46.0'	+00.2'	87.7°	76°46.1'	+04.7'	92.0°	19
20	75°20.3'	-24.1'	63.9°	75°45.0'	-20.7'	67.5°	76°06.2'	-16.9'	71.2°	76°23.6'	-12.9'	75.1°	76°37.0'	-08.7'	79.2°	76°46.1'	-04.3'	83.3°	76°50.9'	+00.3'	87.6°	20
21	74°56.2'	-27.3'	60.3°	75°24.4'	-24.1'	63.7°	75°49.3'	-20.7'	67.2°	76°10.7'	-16.9'	71.0°	76°28.3'	-12.9'	74.9°	76°41.9'	-08.6'	79.0°	76°51.2'	-04.2'	83.2°	21
22	74°28.9'	-30.2'	57.0°	75°00.2'	-27.3'	60.1°	75°28.6'	-24.1'	63.4°	75°53.8'	-20.7'	67.0°	76°15.4'	-16.9'	70.8°	76°33.2'	-12.9'	74.7°	76°47.0'	-08.6'	78.8°	22
23	73°58.7'	-32.8'	53.8°	74°32.9'	-30.2'	56.7°	75°04.5'	-27.3'	59.8°	75°33.1'	-24.2'	63.2°	75°58.5'	-20.7'	66.8°	76°20.4'	-16.9'	70.5°	76°38.4'	-12.9'	74.5°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

14° 346° LHA

Latitude SAME as Declination

14° 346° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

15° 345° LHA

Latitude SAME as Declination

15° 345° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	69°35.5'	+40.9'	132.1°	68°54.6'	+42.5'	134.0°	68°12.2'	+43.9'	135.8°	67°28.6'	+45.2'	137.5°	66°43.8'	+46.4'	139.1°	65°57.9'	+47.5'	140.5°	65°11.1'	+48.5'	141.9°	0
1	70°16.4'	+39.3'	129.9°	69°37.0'	+41.0'	132.0°	68°56.1'	+42.6'	133.9°	68°13.8'	+44.1'	135.8°	67°30.2'	+45.4'	137.4°	66°45.5'	+46.6'	139.0°	65°59.7'	+47.7'	140.5°	1
2	70°55.6'	+37.5'	127.7°	70°18.1'	+39.4'	129.9°	69°38.8'	+41.2'	132.0°	68°57.9'	+42.8'	133.9°	68°15.6'	+44.2'	135.7°	67°32.0'	+45.5'	137.4°	66°47.3'	+46.7'	139.0°	2
3	71°33.1'	+35.5'	125.2°	70°57.5'	+37.6'	127.6°	70°19.9'	+39.6'	129.8°	69°40.7'	+41.3'	131.9°	68°59.8'	+42.9'	133.9°	68°17.6'	+44.4'	135.7°	67°34.0'	+45.7'	137.4°	3
4	72°08.6'	+33.3'	122.6°	71°35.1'	+35.7'	125.2°	70°59.5'	+37.8'	127.6°	70°22.0'	+39.8'	129.8°	69°42.8'	+41.5'	131.9°	69°02.0'	+43.1'	133.8°	68°19.7'	+44.6'	135.6°	4
5	72°41.9'	+30.9'	119.9°	72°10.8'	+33.5'	122.6°	71°37.3'	+35.8'	125.1°	71°01.8'	+38.0'	127.5°	70°24.3'	+39.9'	129.8°	69°45.1'	+41.7'	131.8°	69°04.3'	+43.3'	133.8°	5
6	73°12.8'	+28.3'	117.0°	72°44.3'	+31.1'	119.8°	72°13.2'	+33.7'	122.6°	71°39.8'	+36.0'	125.1°	71°04.2'	+38.2'	127.5°	70°26.8'	+40.1'	129.7°	69°47.6'	+41.9'	131.8°	6
7	73°41.1'	+25.4'	113.9°	73°15.3'	+28.5'	116.9°	72°46.8'	+31.3'	119.8°	72°15.8'	+33.9'	122.5°	71°42.4'	+36.2'	125.1°	71°06.9'	+38.4'	127.5°	70°29.5'	+40.3'	129.7°	7
8	74°06.5'	+22.3'	110.6°	73°43.8'	+25.6'	113.8°	73°18.1'	+28.7'	116.9°	72°49.6'	+31.5'	119.8°	72°18.6'	+34.1'	122.5°	71°45.3'	+36.4'	125.1°	71°09.8'	+38.6'	127.5°	8
9	74°28.8'	+19.0'	107.2°	74°09.4'	+22.5'	110.5°	73°46.8'	+25.8'	113.8°	73°21.1'	+28.9'	116.8°	72°52.7'	+31.7'	119.7°	72°21.7'	+34.3'	122.5°	71°48.3'	+36.6'	125.0°	9
10	74°47.8'	+15.5'	103.6°	74°31.9'	+19.2'	107.1°	74°12.6'	+22.7'	110.5°	73°50.0'	+26.0'	113.7°	73°24.4'	+29.1'	116.8°	72°56.0'	+31.9'	119.7°	72°25.0'	+34.5'	122.5°	10
11	75°03.3'	+11.8'	99.9°	74°51.1'	+15.7'	103.5°	74°35.3'	+19.4'	107.1°	74°16.0'	+22.9'	110.5°	73°53.5'	+26.2'	113.7°	73°27.9'	+29.3'	116.8°	72°59.4'	+32.1'	119.7°	11
12	75°15.1'	+07.9'	96.1°	75°06.8'	+11.9'	99.8°	74°54.7'	+15.8'	103.5°	74°38.9'	+19.6'	107.0°	74°19.7'	+23.1'	110.4°	73°57.1'	+26.4'	113.7°	73°31.6'	+29.5'	116.8°	12
13	75°23.0'	+03.9'	92.1°	75°18.7'	+08.0'	96.0°	75°10.5'	+12.1'	99.7°	74°58.5'	+16.0'	103.4°	74°42.8'	+19.8'	107.0°	74°23.6'	+23.3'	110.4°	74°01.1'	+26.7'	113.7°	13
14	75°26.9'	-00.1'	88.2°	75°26.8'	+04.1'	92.0°	75°22.6'	+08.2'	95.9°	75°14.5'	+12.3'	99.6°	75°02.6'	+16.2'	103.3°	74°46.9'	+20.0'	106.9°	74°27.7'	+23.6'	110.4°	14
15	75°26.8'	-04.1'	84.2°	75°30.8'	+00.0'	88.0°	75°30.9'	+04.2'	91.9°	75°26.8'	+08.4'	95.8°	75°18.8'	+12.5'	99.6°	75°06.9'	+16.4'	103.3°	74°51.3'	+20.2'	106.9°	15
16	75°22.6'	-08.1'	80.2°	75°30.9'	-04.0'	84.0°	75°35.1'	+00.1'	87.9°	75°35.2'	+04.3'	91.8°	75°31.3'	+08.5'	95.7°	75°23.3'	+12.6'	99.5°	75°11.5'	+16.6'	103.2°	16
17	75°14.5'	-12.0'	76.3°	75°26.8'	-08.0'	80.1°	75°35.2'	-03.9'	83.9°	75°39.5'	+00.3'	87.8°	75°39.8'	+04.5'	91.7°	75°36.0'	+08.7'	95.6°	75°28.1'	+12.8'	99.4°	17
18	75°02.6'	-15.7'	72.5°	75°18.8'	-11.9'	76.1°	75°31.3'	-07.9'	79.9°	75°39.8'	-03.8'	83.8°	75°44.3'	+00.4'	87.7°	75°44.7'	+04.6'	91.6°	75°40.9'	+08.9'	95.5°	18
19	74°46.9'	-19.2'	68.8°	75°06.9'	-15.6'	72.3°	75°23.3'	-11.8'	76.0°	75°36.0'	-07.9'	79.7°	75°44.7'	-03.7'	83.6°	75°49.3'	+00.5'	87.5°	75°49.8'	+04.8'	91.5°	19
20	74°27.7'	-22.5'	65.2°	74°51.3'	-19.2'	68.6°	75°11.5'	-15.6'	72.1°	75°28.1'	-11.8'	75.8°	75°40.9'	-07.8'	79.6°	75°49.8'	-03.6'	83.5°	75°54.6'	+00.6'	87.4°	20
21	74°05.2'	-25.6'	61.8°	7																		

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

16° 344° LHA

Latitude SAME as Declination

16° 344° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	68°51.7'	+39.5'	130.2°	68°12.2'	+41.1'	132.1°	67°31.3'	+42.6'	133.9°	66°49.1'	+44.0'	135.6°	66°05.7'	+45.2'	137.1°	65°21.2'	+46.4'	138.6°	64°35.6'	+47.4'	140.0°	0
1	69°31.1'	+37.8'	128.0°	68°53.3'	+39.6'	130.1°	68°13.9'	+41.3'	132.0°	67°33.1'	+42.8'	133.8°	66°50.9'	+44.2'	135.5°	66°07.5'	+45.4'	137.1°	65°23.1'	+46.5'	138.6°	1
2	70°09.0'	+36.0'	125.8°	69°33.0'	+38.0'	128.0°	68°55.2'	+39.8'	130.0°	68°15.9'	+41.5'	131.9°	67°35.1'	+43.0'	133.7°	66°52.9'	+44.3'	135.4°	66°09.6'	+45.6'	137.0°	2
3	70°45.0'	+34.1'	123.4°	70°11.0'	+36.2'	125.7°	69°35.0'	+38.2'	127.9°	68°57.3'	+40.0'	130.0°	68°18.0'	+41.6'	131.9°	67°37.2'	+43.1'	133.7°	66°55.1'	+44.5'	135.4°	3
4	71°19.1'	+31.9'	120.9°	70°47.2'	+34.3'	123.3°	70°13.2'	+36.4'	125.7°	69°37.3'	+38.4'	127.8°	68°59.6'	+40.2'	129.9°	68°20.4'	+41.8'	131.8°	67°39.6'	+43.3'	133.7°	4
5	71°51.0'	+29.6'	118.2°	71°21.5'	+32.1'	120.8°	70°49.6'	+34.4'	123.3°	70°15.7'	+36.6'	125.6°	69°39.8'	+38.6'	127.8°	69°02.2'	+40.4'	129.9°	68°22.9'	+42.0'	131.8°	5
6	72°20.5'	+27.0'	115.3°	71°53.5'	+29.7'	118.1°	71°24.1'	+32.3'	120.7°	70°52.3'	+34.6'	123.2°	70°18.4'	+36.8'	125.6°	69°42.5'	+38.8'	127.8°	69°04.9'	+40.5'	129.8°	6
7	72°47.5'	+24.2'	112.4°	72°23.3'	+27.2'	115.3°	71°56.4'	+29.9'	118.1°	71°26.9'	+32.5'	120.7°	70°55.2'	+34.8'	123.2°	70°21.3'	+37.0'	125.5°	69°45.5'	+39.0'	127.7°	7
8	73°11.8'	+21.3'	109.2°	72°50.5'	+24.4'	112.3°	72°26.3'	+27.4'	115.2°	71°59.4'	+30.2'	118.0°	71°30.0'	+32.7'	120.7°	70°58.3'	+35.1'	123.2°	70°24.4'	+37.2'	125.5°	8
9	73°33.0'	+18.1'	106.0°	73°14.9'	+21.5'	109.2°	72°53.7'	+24.6'	112.2°	72°29.6'	+27.6'	115.2°	72°02.7'	+30.4'	118.0°	71°33.3'	+32.9'	120.6°	71°01.6'	+35.3'	123.1°	9
10	73°51.1'	+14.8'	102.6°	73°36.4'	+18.3'	105.9°	73°18.3'	+21.7'	109.1°	72°57.2'	+24.8'	112.2°	72°33.1'	+27.8'	115.1°	72°06.3'	+30.6'	117.9°	71°36.9'	+33.1'	120.6°	10
11	74°05.9'	+11.3'	99.1°	73°54.7'	+14.9'	102.5°	73°40.0'	+18.5'	105.8°	73°22.0'	+21.9'	109.0°	73°00.9'	+25.1'	112.1°	72°36.8'	+28.0'	115.1°	72°10.0'	+30.8'	117.9°	11
12	74°17.1'	+07.6'	95.5°	74°09.6'	+11.4'	99.0°	73°58.5'	+15.1'	102.4°	73°43.9'	+18.7'	105.8°	73°26.0'	+22.1'	109.0°	73°04.9'	+25.3'	112.1°	72°40.9'	+28.3'	115.1°	12
13	74°24.8'	+03.9'	91.8°	74°21.1'	+07.8'	95.3°	74°13.6'	+11.6'	98.9°	74°02.6'	+15.3'	102.3°	73°48.0'	+18.9'	105.7°	73°30.2'	+22.3'	109.0°	73°09.1'	+25.5'	112.1°	13
14	74°28.7'	+00.2'	88.1°	74°28.8'	+04.1'	91.7°	74°25.2'	+08.0'	95.2°	74°17.9'	+11.8'	98.8°	74°06.9'	+15.5'	102.3°	73°52.5'	+19.1'	105.6°	73°34.6'	+22.5'	108.9°	14
15	74°28.8'	-03.6'	84.3°	74°32.9'	+00.3'	87.9°	74°33.2'	+04.2'	91.5°	74°29.7'	+08.1'	95.1°	74°22.5'	+12.0'	98.7°	74°11.6'	+15.7'	102.2°	73°57.2'	+19.3'	105.6°	15
16	74°25.2'	-07.3'	80.6°	74°33.2'	-03.5'	84.2°	74°37.4'	+00.4'	87.8°	74°37.8'	+04.4'	91.4°	74°34.5'	+08.3'	95.0°	74°27.3'	+12.2'	98.6°	74°16.5'	+15.9'	102.1°	16
17	74°17.9'	-11.0'	76.9°	74°29.7'	-07.2'	80.4°	74°37.8'	-03.4'	84.0°	74°42.2'	+00.5'	87.6°	74°42.8'	+04.5'	91.3°	74°39.5'	+08.5'	95.0°	74°32.4'	+12.4'	98.6°	17
18	74°06.9'	-14.5'	73.3°	74°22.5'	-10.9'	76.7°	74°34.5'	-07.1'	80.2°	74°42.8'	-03.3'	83.9°	74°47.3'	+00.7'	87.5°	74°47.9'	+04.7'	91.2°	74°44.8'	+08.6'	94.9°	18
19	73°52.5'	-17.8'	69.8°	74°11.6'	-14.4'	73.1°	74°27.3'	-10.8'	76.5°	74°39.5'	-07.1'	80.1°	74°47.9'	-03.2'	83.7°	74°52.6'	+00.8'	87.4°	74°53.4'	+04.8'	91.1°	19
20	73°34.6'	-21.0'	66.4°	73°57.2'	-17.8'	69.6°	74°16.5'	-14.4'	72.9°	74°32.4'	-10.8'	76.3°	74°44.8'	-07.0'	79.9°	74°53.4'	-03.1'	83.5°	74°58.2'	+00.9'	87.2°	20
21	73°13.6'	-24.0'	63.1°	73°39.4'	-21.0'	66.1°	74°02.1'	-17.8'	69.3°	74°21.7'	-14.3'	72.7°	74°37.8'	-10.7'	76.1°	74°50.4'	-06.9'	79.7°	74°59.2'	-03.0'	83.4°	21
22	72°49.6'	-26.8'	59.9°	73°18.4'	-24.0'	62.8°	73°44.3'	-21.0'	65.9°	74°07.3'	-17.7'	69.1°	74°27.1'	-14.3'	72.4°	74°43.5'	-10.7'	75.9°	74°56.2'	-06.8'	79.5°	22
23	72°22.8'	-29.4'	57.0°	72°54.4'	-26.8'	59.7°	73°23.4'	-24.0'	62.6°	73°49.6'	-21.0'	65.6°	74°12.8'	-14.7'	68.8°	74°32.8'	-14.3'	72.2°	74°49.4'	-10.6'	75.7°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

16° 344° LHA

Latitude SAME as Declination

16° 344° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

17° 343° LHA

Latitude SAME as Declination

17° 343° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	68°06.6'	+38.2'	128.4°	67°28.6'	+39.8'	130.2°	66°49.1'	+41.4'	132.0°	66°08.2'	+42.8'	133.7°	65°26.2'	+44.1'	135.3°	64°43.0'	+45.3'	136.8°	63°58.7'	+46.3'	138.2°	0
1	68°44.7'	+36.5'	126.3°	68°08.4'	+38.3'	128.3°	67°30.5'	+40.0'	130.2°	66°51.0'	+41.5'	132.0°	66°10.3'	+42.9'	133.7°	65°28.2'	+44.2'	135.2°	64°45.1'	+45.4'	136.7°	1
2	69°21.2'	+34.7'	124.0°	68°46.7'	+36.7'	126.2°	68°10.5'	+38.5'	128.2°	67°32.6'	+40.2'	130.1°	66°53.2'	+41.7'	131.9°	66°12.5'	+43.1'	133.6°	65°30.5'	+44.4'	135.2°	2
3	69°55.9'	+32.7'	121.7°	69°23.4'	+34.9'	124.0°	68°49.0'	+36.9'	126.1°	68°12.8'	+38.7'	128.1°	67°34.9'	+40.4'	130.0°	66°55.6'	+41.9'	131.8°	66°14.9'	+43.3'	133.5°	3
4	70°28.7'	+30.6'	119.2°	69°58.3'	+32.9'	121.6°	69°25.8'	+35.1'	123.9°	68°51.4'	+37.1'	126.0°	68°15.3'	+38.9'	128.1°	67°37.5'	+40.6'	130.0°	66°58.2'	+42.1'	131.8°	4
5	70°59.3'	+28.3'	116.6°	70°31.2'	+30.8'	119.1°	70°00.9'	+33.1'	121.5°	69°28.5'	+35.3'	123.8°	68°54.2'	+37.3'	126.0°	68°18.1'	+39.1'	128.0°	67°40.3'	+40.8'	129.9°	5
6	71°27.6'	+25.8'	113.9°	71°02.1'	+28.5'	116.5°	70°34.1'	+31.0'	119.1°	70°03.8'	+33.3'	121.5°	69°31.4'	+35.5'	123.8°	68°57.1'	+37.5'	125.9°	68°21.1'	+39.3'	128.0°	6
7	71°53.4'	+23.2'	111.0°	71°30.6'	+26.0'	113.8°	71°05.1'	+28.7'	116.5°	70°37.1'	+31.2'	119.0°	70°06.9'	+33.6'	121.4°	69°34.6'	+35.7'	123.7°	69°00.3'	+37.7'	125.9°	7
8	72°16.6'	+20.3'	108.0°	71°56.6'	+23.4'	110.9°	71°33.8'	+26.2'	113.7°	71°08.4'	+28.9'	116.4°	70°40.5'	+31.4'	119.0°	70°10.3'	+33.8'	121.4°	69°38.0'	+35.9'	123.7°	8
9	72°36.9'	+17.3'	104.9°	72°20.0'	+20.5'	107.9°	72°00.0'	+23.6'	110.8°	71°37.3'	+26.5'	113.7°	71°11.9'	+29.2'	116.4°	70°44.1'	+31.7'	118.9°	70°13.9'	+34.0'	121.4°	9
10	72°54.2'	+14.1'	101.6°	72°40.5'	+17.5'	104.8°	72°23.6'	+20.7'	107.8°	72°03.8'	+23.8'	110.8°	71°41.1'	+26.7'	113.6°	71°15.8'	+29.4'	116.3°	70°47.9'	+31.9'	118.9°	10
11	73°08.3'	+10.8'	98.3°	72°58.0'	+14.3'	101.6°	72°44.3'	+17.7'	104.7°	72°27.6'	+20.9'	107.8°	72°07.8'	+24.0'	110.7°	71°45.1'	+26.9'	113.6°	71°19.8'	+29.6'	116.3°	11
12	73°19.2'	+07.4'	94.9°	73°12.3'	+11.0'	98.2°	73°02.1'	+14.5'	101.5°	72°48.5'	+17.9'	104.6°	72°31.8'	+21.2'	107.7°	72°12.1'	+24.2'	110.7°	71°49.5'	+27.1'	113.5°	12
13	73°26.6'	+03.9'	91.4°	73°23.3'	+07.6'	94.8°	73°16.6'	+11.2'	98.1°	73°06.4'	+14.7'	101.4°	72°52.9'	+18.1'	104.6°	72°36.3'	+21.4'	107.7°	72°16.6'	+24.5'	110.6°	13
14	73°30.5'	+00.4'	87.9°	73°30.9'	+04.1'	91.3°	73°27.8'	+07.8'	94.7°	73°21.1'	+11.4'	98.0°	73°11.1'	+14.9'	101.3°	72°57.7'	+18.3'	104.5°	72°41.1'	+21.6'	107.6°	14
15	73°30.9'	-03.1'	84.4°	73°35.0'	+00.5'	87.8°	73°35.5'	+04.2'	91.2°	73°32.5'	+07.9'	94.6°	73°26.0'	+11.6'	97.9°	73°16.0'	+15.1'	101.2°	73°02.7'	+18.6'	104.4°	15
16	73°27.8'	-06.6'	80.9°	73°35.5'	-03.0'	84.2°	73°39.8'	+00.7'	87.6°	73°40.5'	+04.4'	91.1°	73°37.6'	+08.1'	94.5°	73°31.2'	+11.8'	97.8°	73°21.3'	+15.3'	101.1°	16
17	73°21.1'	-10.1'	77.4°	73°32.5'	-06.5'	80.7°	73°40.5'	-02.9'	84.1°	73°44.9'	+00.8'	87.5°	73°45.7'	+04.6'	90.9°	73°42.9'	+08.3'	94.4°	73°36.6'	+12.0'	97.7°	17
18	73°11.1'	-13.4'	74.0°	73°26.0'	-10.0'	77.2°	73°37.6'	-06.4'	80.5°	73°45.7'	-02.8'	83.9°	73°50.3'	+01.0'	87.4°	73°51.2'	+04.7'	90.8°	73°48.6'	+08.5'	94.3°	18
19	72°57.7'	-16.6'	70.6°	73°16.0'	-13.3'	73.8°	73°31.2'	-09.9'	77.0°	73°42.9'	-06.3'	80.4°	73°51.2'	-02.7'	83.8°	73°55.9'	+01.1'	87.2°	73°57.0'	+04.9'	90.7°	19
20	72°41.1'	-19.6'	67.4°	73°02.7'	-16.5'	70.4°	73°21.3'	-13.3'	73.6°	73°36.6'	-09.8'	76.8°	73°48.6'	-06.2'	80.2°	73°57.0'	-02.5'	83.6°	74°01.9'	+01.2'	87.1°	20
21	72°21.4'	-22.5'	64.2°	72°46.1'</																		

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

18° 342° LHA

Latitude SAME as Declination

18° 342° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	67°20.4'	+36.9'	126.7°	66°43.8'	+38.6'	128.5°	66°05.7'	+40.2'	130.3°	65°26.2'	+41.6'	132.0°	64°45.4'	+42.9'	133.6°	64°03.5'	+44.2'	135.1°	63°20.5'	+45.3'	136.5°	0
1	67°57.3'	+35.2'	124.6°	67°22.4'	+37.1'	126.6°	66°45.8'	+38.8'	128.5°	66°07.8'	+40.3'	130.2°	65°28.4'	+41.8'	131.9°	64°47.7'	+43.1'	133.5°	64°05.8'	+44.3'	135.0°	1
2	68°32.5'	+33.5'	122.4°	67°59.4'	+35.4'	124.5°	67°24.6'	+37.3'	126.5°	66°48.1'	+39.0'	128.4°	66°10.1'	+40.5'	130.2°	65°30.8'	+42.0'	131.8°	64°50.1'	+43.3'	133.4°	2
3	69°06.0'	+31.5'	120.1°	68°34.9'	+33.7'	122.3°	68°01.9'	+35.6'	124.4°	67°27.1'	+37.5'	126.4°	66°50.7'	+39.2'	128.3°	66°12.8'	+40.7'	130.1°	65°33.4'	+42.2'	131.8°	3
4	69°37.5'	+29.4'	117.7°	69°08.5'	+31.7'	120.0°	68°37.5'	+33.9'	122.2°	68°04.6'	+35.8'	124.3°	67°29.8'	+37.7'	126.3°	66°53.5'	+39.4'	128.2°	66°15.6'	+40.9'	130.0°	4
5	70°06.9'	+27.2'	115.2°	69°40.2'	+29.6'	117.6°	69°11.4'	+31.9'	119.9°	68°40.4'	+34.1'	122.2°	68°07.5'	+36.0'	124.3°	67°32.8'	+37.9'	126.3°	66°56.5'	+39.6'	128.2°	5
6	70°34.1'	+24.8'	112.5°	70°09.9'	+27.4'	115.1°	69°43.3'	+29.8'	117.5°	69°14.5'	+32.1'	119.9°	68°43.5'	+34.3'	122.1°	68°10.7'	+36.3'	124.2°	67°36.1'	+38.1'	126.2°	6
7	70°58.9'	+22.2'	109.7°	70°37.3'	+25.0'	112.4°	70°13.1'	+27.6'	115.0°	69°46.6'	+30.1'	117.5°	69°17.8'	+32.4'	119.8°	68°47.0'	+34.5'	122.1°	68°14.2'	+36.5'	124.2°	7
8	71°21.1'	+19.5'	106.9°	71°02.2'	+22.4'	109.7°	70°40.7'	+25.2'	112.3°	70°16.7'	+27.8'	114.9°	69°50.2'	+30.3'	117.4°	69°21.5'	+32.6'	119.8°	68°50.7'	+34.7'	122.0°	8
9	71°40.5'	+16.6'	103.9°	71°24.6'	+19.7'	106.8°	71°05.9'	+22.6'	109.6°	70°44.5'	+25.4'	112.3°	70°20.5'	+28.1'	114.9°	69°54.1'	+30.5'	117.4°	69°25.4'	+32.8'	119.7°	9
10	71°57.1'	+13.6'	100.8°	71°44.3'	+16.8'	103.8°	71°28.5'	+19.9'	106.7°	71°09.9'	+22.8'	109.5°	70°48.5'	+25.6'	112.2°	70°24.6'	+28.3'	114.8°	69°58.2'	+30.8'	117.3°	10
11	72°10.7'	+10.5'	97.6°	72°01.1'	+13.8'	100.7°	71°48.4'	+17.0'	103.7°	71°32.7'	+20.1'	106.6°	71°14.2'	+23.1'	109.4°	70°52.9'	+25.9'	112.2°	70°29.0'	+28.5'	114.8°	11
12	72°21.1'	+07.2'	94.4°	72°14.9'	+10.6'	97.5°	72°05.4'	+14.0'	100.6°	71°52.9'	+17.2'	103.6°	71°37.3'	+20.3'	106.5°	71°18.8'	+23.3'	109.4°	70°57.5'	+26.1'	112.1°	12
13	72°28.4'	+04.0'	91.1°	72°25.5'	+07.4'	94.3°	72°19.4'	+10.8'	97.4°	72°10.1'	+14.2'	100.5°	71°57.6'	+17.4'	103.5°	71°42.1'	+20.6'	106.5°	71°23.6'	+23.5'	109.3°	13
14	72°32.3'	+00.6'	87.8°	72°33.0'	+04.1'	91.0°	72°30.3'	+07.6'	94.2°	72°24.3'	+11.0'	97.3°	72°15.0'	+14.4'	100.4°	72°02.6'	+17.7'	103.4°	71°47.2'	+20.8'	106.4°	14
15	72°33.0'	-02.7'	84.5°	72°37.1'	+00.8'	87.7°	72°37.9'	+04.3'	90.8°	72°35.3'	+07.8'	94.0°	72°29.4'	+11.2'	97.2°	72°20.3'	+14.6'	100.3°	72°08.0'	+17.9'	103.4°	15
16	72°30.3'	-06.0'	81.1°	72°37.9'	-02.6'	84.3°	72°42.2'	+00.9'	87.5°	72°43.1'	+04.5'	90.7°	72°40.7'	+08.0'	93.9°	72°34.9'	+11.4'	97.1°	72°25.9'	+14.8'	100.2°	16
17	72°24.3'	-09.2'	77.8°	72°35.3'	-05.9'	81.0°	72°43.1'	-02.4'	84.1°	72°47.6'	+01.1'	87.3°	72°48.6'	+04.6'	90.6°	72°46.3'	+08.2'	93.8°	72°40.7'	+11.6'	97.0°	17
18	72°15.0'	-12.4'	74.6°	72°29.4'	-09.1'	77.6°	72°40.7'	-05.8'	80.8°	72°48.6'	-02.3'	84.0°	72°53.3'	+01.2'	87.2°	72°54.5'	+04.8'	90.4°	72°52.3'	+08.3'	93.7°	18
19	72°02.6'	-15.5'	71.4°	72°20.3'	-12.3'	74.4°	72°34.9'	-09.1'	77.4°	72°46.3'	-05.7'	80.6°	72°54.5'	-02.2'	83.8°	72°59.3'	+01.4'	87.0°	73°00.7'	+05.0'	90.3°	19
20	71°47.2'	-18.4'	68.3°	72°08.0'	-15.4'	71.2°	72°25.9'	-12.3'	74.2°	72°40.7'	-09.0'	77.2°	72°52.3'	-05.6'	80.4°	73°00.7'	-02.0'	83.6°	73°05.6'	+01.5'	86.9°	20
21	71°28.8'	-21.2'	65.3°	71°52.6'	-18.3'	68.0°	72°13.6'	-15.3'	70.9°	72°31.7'	-12.2'	73.9°	72°46.8'	-08.9'	77.0°	72°58.6'	-05.4'	80.2°	73°07.1'	-01.9'	83.5°	21
22	71°07.6'	-23.8'	62.3°	71°34.2'	-21.1'	65.0°	71°58.3'	-18.3'	67.8°	72°19.5'	-15.3'	70.7°	72°37.9'	-12.1'	73.7°	72°53.2'	-08.8'	76.8°	73°05.2'	-05.4'	80.0°	22
23	70°43.8'	-26.3'	59.5°	71°13.1'	-23.8'	62.1°	71°40.0'	-21.1'	64.7°	72°04.2'	-18.3'	67.5°	72°25.8'	-15.3'	70.4°	72°44.4'	-12.1'	73.5°	72°59.9'	-08.7'	76.6°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

18° 342° LHA

Latitude SAME as Declination

18° 342° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

19° 341° LHA

Latitude SAME as Declination

19° 341° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	66°33.2'	+35.7'	125.1°	65°57.9'	+37.4'	126.9°	65°21.2'	+39.0'	128.7°	64°43.0'	+40.5'	130.3°	64°03.5'	+41.8'	131.9°	63°22.9'	+43.1'	133.4°	62°41.1'	+44.3'	134.8°	0
1	67°08.9'	+34.1'	123.0°	66°35.3'	+35.9'	125.0°	66°00.1'	+37.6'	126.8°	65°23.4'	+39.2'	128.6°	64°45.3'	+40.7'	130.2°	64°05.9'	+42.0'	131.8°	63°25.4'	+43.3'	133.3°	1
2	67°43.0'	+32.3'	120.9°	67°11.2'	+34.3'	122.9°	66°37.8'	+36.1'	124.9°	66°02.6'	+37.8'	126.7°	65°26.0'	+39.4'	128.5°	64°48.0'	+40.9'	130.2°	64°08.6'	+42.2'	131.7°	2
3	68°15.3'	+30.4'	118.7°	67°45.5'	+32.5'	120.8°	67°13.8'	+34.5'	122.9°	66°40.4'	+36.3'	124.8°	66°05.4'	+38.0'	126.7°	65°28.8'	+39.6'	128.4°	64°50.8'	+41.1'	130.1°	3
4	68°45.6'	+28.3'	116.3°	68°18.0'	+30.6'	118.6°	67°48.3'	+32.7'	120.7°	67°16.7'	+34.7'	122.8°	66°43.4'	+36.5'	124.7°	66°08.4'	+38.2'	126.6°	65°31.9'	+39.8'	128.4°	4
5	69°13.9'	+26.1'	113.8°	68°48.6'	+28.5'	116.2°	68°21.0'	+30.8'	118.5°	67°51.4'	+32.9'	120.6°	67°19.9'	+34.9'	122.7°	66°46.6'	+36.7'	124.6°	66°11.7'	+38.4'	126.5°	5
6	69°40.1'	+23.8'	111.3°	69°17.1'	+26.3'	113.7°	68°51.8'	+28.8'	116.1°	68°24.3'	+31.0'	118.4°	67°54.8'	+33.1'	120.6°	67°23.4'	+35.1'	122.6°	66°50.1'	+37.0'	124.6°	6
7	70°03.9'	+21.3'	108.6°	69°43.5'	+24.0'	111.2°	69°20.6'	+26.6'	113.7°	68°55.4'	+29.0'	116.0°	68°27.9'	+31.3'	118.3°	67°58.5'	+33.4'	120.5°	67°27.1'	+35.3'	122.6°	7
8	70°25.2'	+18.7'	105.8°	70°07.5'	+21.5'	108.5°	69°47.1'	+24.2'	111.1°	69°24.3'	+26.8'	113.6°	68°59.2'	+29.2'	116.0°	68°31.9'	+31.5'	118.3°	68°02.4'	+33.6'	120.4°	8
9	70°43.9'	+16.0'	103.0°	70°29.0'	+18.9'	105.7°	70°11.4'	+21.8'	108.4°	69°51.1'	+24.5'	111.0°	69°28.4'	+27.0'	113.5°	69°03.3'	+29.5'	115.9°	68°36.1'	+31.7'	118.2°	9
10	70°59.8'	+13.1'	100.0°	70°47.9'	+16.2'	102.9°	70°33.1'	+19.1'	105.6°	70°15.6'	+22.0'	108.3°	69°55.5'	+24.7'	110.9°	69°32.8'	+27.3'	113.4°	69°07.8'	+29.7'	115.8°	10
11	71°12.9'	+10.1'	97.0°	71°04.1'	+13.3'	99.9°	70°52.3'	+16.4'	102.8°	70°37.6'	+19.4'	105.5°	70°20.2'	+22.2'	108.2°	70°00.1'	+25.0'	110.9°	69°37.5'	+27.5'	113.4°	11
12	71°23.1'	+07.1'	94.0°	71°17.4'	+10.3'	96.9°	71°08.7'	+13.5'	99.8°	70°57.0'	+16.6'	102.7°	70°42.4'	+19.6'	105.5°	70°25.0'	+22.5'	108.2°	70°05.0'	+25.2'	110.8°	12
13	71°30.2'	+04.0'	90.8°	71°27.7'	+07.3'	93.8°	71°22.2'	+10.5'	96.8°	71°13.6'	+13.7'	99.7°	71°02.0'	+16.8'	102.6°	70°47.5'	+19.8'	105.4°	70°30.2'	+22.7'	108.1°	13
14	71°34.2'	+00.9'	87.7°	71°35.0'	+04.2'	90.7°	71°32.7'	+07.5'	93.7°	71°27.3'	+10.7'	96.7°	71°18.8'	+13.9'	99.6°	71°07.3'	+17.1'	102.5°	70°52.9'	+20.1'	105.3°	14
15	71°35.0'	-02.3'	84.5°	71°39.2'	+01.0'	87.5°	71°40.2'	+04.3'	90.5°	71°38.1'	+07.7'	93.6°	71°32.8'	+10.9'	96.5°	71°24.4'	+14.2'	99.5°	71°13.0'	+17.3'	102.4°	15
16	71°32.7'	-05.4'	81.4°	71°40.2'	-02.1'	84.3°	71°44.5'	+01.2'	87.4°	71°45.7'	+04.5'	90.4°	71°43.7'	+07.9'	93.4°	71°38.6'	+11.2'	96.4°	71°30.3'	+14.4'	99.4°	16
17	71°27.3'	-08.5'	78.2°	71°38.1'	-05.3'	81.2°	71°45.7'	-02.0'	84.2°	71°50.2'	+01.3'	87.2°	71°51.6'	+04.7'	90.2°	71°49.7'	+08.0'	93.3°	71°44.7'	+11.4'	96.3°	17
18	71°18.8'	-11.5'	75.1°	71°32.8'	-08.4'	78.0°	71°43.7'	-05.2'	81.0°	71°51.6'	-01.9'	84.0°	71°56.3'	+01.5'	87.0°	71°57.8'	+04.9'	90.1°	71°56.0'	+08.2'	93.2°	18
19	71°07.3'	-14.4'	72.1°	71°24.4'	-11.4'	74.9°	71°38.6'	-08.3'	77.8°	71°49.7'	-05.0'	80.8°	71°57.8'	-01.7'	83.8°	72°02.6'	+01.6'	86.9°	72°04.3'	+05.0'	90.0°	19
20	70°52.9'	-17.2'	69.1°	71°13.0'	-14.3'	71.8°	71°30.3'	-11.3'	74.7°	71°44.7'	-08.2'	77.6°	71°56.0'	-04.9'	80.6°	72°04.3'	-01.6'	83.6°	72°09.3'	+01.8'	86.7°	20
21	70°35.7'	-19.9'	66.2°	70°58.7'	-17																	

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

20° 340° LHA

Latitude SAME as Declination

20° 340° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	65°45.1'	+34.6'	123.6°	65°11.1'	+36.3'	125.4°	64°35.6'	+37.9'	127.1°	63°58.7'	+39.4'	128.8°	63°20.5'	+40.8'	130.3°	62°41.1'	+42.1'	131.8°	62°00.5'	+43.3'	133.2°	0
1	66°19.7'	+32.9'	121.6°	65°47.4'	+34.8'	123.5°	65°13.5'	+36.5'	125.3°	64°38.1'	+38.1'	127.0°	64°01.3'	+39.6'	128.7°	63°23.1'	+41.0'	130.2°	62°43.8'	+42.2'	131.7°	1
2	66°52.6'	+31.2'	119.5°	66°22.2'	+33.1'	121.5°	65°50.0'	+35.0'	123.4°	65°16.2'	+36.7'	125.2°	64°40.9'	+38.3'	126.9°	64°04.1'	+39.8'	128.6°	63°26.0'	+41.2'	130.2°	2
3	67°23.8'	+29.3'	117.3°	66°55.3'	+31.4'	119.4°	66°25.0'	+33.4'	121.4°	65°52.9'	+35.2'	123.3°	65°19.2'	+36.9'	125.1°	64°43.9'	+38.5'	126.9°	64°07.2'	+40.0'	128.5°	3
4	67°53.1'	+27.3'	115.0°	67°26.7'	+29.5'	117.2°	66°58.4'	+31.6'	119.3°	66°28.1'	+33.6'	121.3°	65°56.1'	+35.4'	123.2°	65°22.4'	+37.1'	125.0°	64°47.2'	+38.7'	126.8°	4
5	68°20.4'	+25.2'	112.6°	67°56.3'	+27.5'	114.9°	67°30.0'	+29.8'	117.1°	67°01.7'	+31.8'	119.2°	66°31.5'	+33.8'	121.2°	65°59.5'	+35.6'	123.1°	65°25.9'	+37.4'	125.0°	5
6	68°45.6'	+22.9'	110.1°	68°23.8'	+25.4'	112.5°	67°59.7'	+27.8'	114.8°	67°33.5'	+30.0'	117.0°	67°05.3'	+32.1'	119.1°	66°35.2'	+34.0'	121.1°	66°03.3'	+35.9'	123.1°	6
7	69°08.5'	+20.5'	107.6°	68°49.2'	+23.1'	110.0°	68°27.5'	+25.6'	112.4°	68°03.5'	+28.0'	114.7°	67°37.4'	+30.2'	116.9°	67°09.2'	+32.3'	119.0°	66°39.2'	+34.3'	121.1°	7
8	69°29.1'	+18.0'	104.9°	69°12.3'	+20.8'	107.4°	68°53.1'	+23.4'	109.9°	68°31.5'	+25.9'	112.3°	68°07.6'	+28.2'	114.6°	67°41.6'	+30.5'	116.8°	67°13.5'	+32.6'	119.0°	8
9	69°47.1'	+15.4'	102.2°	69°33.1'	+18.2'	104.8°	69°16.5'	+21.0'	107.3°	68°57.4'	+23.6'	109.8°	68°35.8'	+26.1'	112.2°	68°12.0'	+28.5'	114.5°	67°46.0'	+30.7'	116.8°	9
10	70°02.5'	+12.7'	99.3°	69°51.3'	+15.6'	102.0°	69°37.5'	+18.5'	104.7°	69°21.0'	+21.2'	107.2°	69°02.0'	+23.9'	109.7°	68°40.5'	+26.4'	112.1°	68°16.8'	+28.7'	114.5°	10
11	70°15.1'	+09.9'	96.5°	70°06.9'	+12.9'	99.2°	69°55.9'	+15.8'	101.9°	69°42.2'	+18.7'	104.6°	69°25.8'	+21.5'	107.1°	69°06.9'	+24.1'	109.7°	68°45.5'	+26.6'	112.1°	11
12	70°25.0'	+07.0'	93.5°	70°19.8'	+10.1'	96.3°	70°11.8'	+13.1'	99.1°	70°00.9'	+16.1'	101.8°	69°47.3'	+18.9'	104.5°	69°31.0'	+21.7'	107.1°	69°12.1'	+24.4'	109.6°	12
13	70°32.0'	+04.0'	90.6°	70°29.9'	+07.2'	93.4°	70°24.9'	+10.3'	96.2°	70°17.0'	+13.3'	99.0°	70°06.2'	+16.3'	101.7°	69°52.7'	+19.2'	104.4°	69°36.5'	+22.0'	107.0°	13
14	70°36.0'	+01.1'	87.6°	70°37.1'	+04.2'	90.4°	70°35.2'	+07.4'	93.2°	70°30.3'	+10.5'	96.1°	70°22.5'	+13.5'	98.9°	70°11.9'	+16.5'	101.6°	69°58.4'	+19.4'	104.3°	14
15	70°37.1'	-01.9'	84.5°	70°41.3'	+01.2'	87.4°	70°42.5'	+04.4'	90.2°	70°40.8'	+07.6'	93.1°	70°36.1'	+10.7'	95.9°	70°28.4'	+13.8'	98.7°	70°17.8'	+16.8'	101.5°	15
16	70°35.2'	-04.9'	81.5°	70°42.5'	-01.7'	84.4°	70°46.9'	+01.4'	87.2°	70°48.3'	+04.6'	90.1°	70°46.8'	+07.8'	93.0°	70°42.2'	+10.9'	95.8°	70°34.6'	+14.0'	98.6°	16
17	70°30.3'	-07.8'	78.5°	70°40.8'	-04.7'	81.3°	70°48.3'	-01.6'	84.2°	70°52.9'	+01.6'	87.0°	70°54.5'	+04.8'	89.9°	70°53.1'	+08.0'	92.8°	70°48.6'	+11.1'	95.7°	17
18	70°22.5'	-10.7'	75.6°	70°36.1'	-07.7'	78.3°	70°46.8'	-04.6'	81.1°	70°54.5'	-01.4'	84.0°	70°59.3'	+01.7'	86.9°	71°01.0'	+05.0'	89.8°	70°59.7'	+08.2'	92.7°	18
19	70°11.9'	-13.4'	72.7°	70°28.4'	-10.5'	75.4°	70°42.2'	-07.5'	78.1°	70°53.1'	-04.5'	80.9°	71°01.0'	-01.3'	83.8°	71°06.0'	+01.9'	86.7°	71°07.9'	+05.1'	89.6°	19
20	69°58.4'	-16.1'	69.8°	70°17.8'	-13.4'	72.4°	70°34.6'	-10.4'	75.1°	70°48.6'	-07.4'	77.9°	70°59.7'	-04.3'	80.7°	71°07.9'	-01.2'	83.6°	71°13.0'	+02.1'	86.5°	20
21	69°42.3'	-18.7'	67.0°	70°04.5'	-16.1'	69.5°	70°24.2'	-13.3'	72.2°	70°41.2'	-10.4'	74.9°	70°55.4'	-07.3'	77.7°	71°06.8'	-04.2'	80.5°	71°15.1'	-01.0'	83.4°	21
22	69°23.5'	-21.2'	64.3°	69°48.4'	-18.7'	66.7°	70°10.9'	-16.0'	69.3°	70°30.8'	-13.2'	71.9°	70°48.1'	-10.3'	74.7°	71°02.6'	-07.2'	77.5°	71°14.1'	-04.1'	80.3°	22
23	69°02.3'	-23.6'	61.7°	69°29.7'	-21.2'	64.0°	69°54.9'	-18.6'	66.5°	70°17.6'	-15.9'	69.0°	70°37.8'	-13.1'	71.7°	70°55.3'	-10.2'	74.4°	71°10.0'	-07.1'	77.2°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

20° 340° LHA

Latitude SAME as Declination

20° 340° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

21° 339° LHA

Latitude SAME as Declination

21° 339° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	64°56.3'	+33.5'	122.2°	64°23.5'	+35.2'	124.0°	63°49.2'	+36.8'	125.7°	63°13.5'	+38.3'	127.3°	62°36.5'	+39.7'	128.8°	61°58.3'	+41.0'	130.3°	61°18.9'	+42.3'	131.7°	0
1	65°29.8'	+31.9'	120.2°	64°58.7'	+33.7'	122.1°	64°26.0'	+35.4'	123.9°	63°51.9'	+37.0'	125.6°	63°16.3'	+38.5'	127.2°	62°39.4'	+39.9'	128.7°	62°01.2'	+41.3'	130.2°	1
2	66°01.6'	+30.2'	118.2°	65°32.4'	+32.1'	120.1°	65°01.5'	+33.9'	122.0°	64°28.9'	+35.6'	123.8°	63°54.8'	+37.3'	125.5°	63°19.3'	+38.8'	127.1°	62°42.5'	+40.2'	128.6°	2
3	66°31.8'	+28.3'	116.0°	66°04.5'	+30.4'	118.1°	65°35.4'	+32.3'	120.0°	65°04.5'	+34.2'	121.9°	64°32.1'	+35.9'	123.7°	63°58.1'	+37.5'	125.4°	63°22.6'	+39.0'	127.0°	3
4	67°00.1'	+26.4'	113.8°	66°34.9'	+28.5'	115.9°	66°07.7'	+30.6'	117.9°	65°38.7'	+32.6'	119.9°	65°07.9'	+34.4'	121.8°	64°35.5'	+36.1'	123.6°	64°01.6'	+37.7'	125.3°	4
5	67°26.5'	+24.3'	111.5°	67°03.4'	+26.6'	113.7°	66°38.3'	+28.8'	115.8°	66°11.3'	+30.8'	117.8°	65°42.3'	+32.8'	119.8°	65°11.6'	+34.6'	121.7°	64°39.3'	+36.3'	123.5°	5
6	67°50.8'	+22.1'	109.1°	67°30.0'	+24.5'	111.4°	67°07.1'	+26.8'	113.6°	66°42.1'	+29.0'	115.7°	66°15.1'	+31.1'	117.7°	65°46.3'	+33.0'	119.7°	65°15.7'	+34.9'	121.6°	6
7	68°12.9'	+19.8'	106.6°	67°54.6'	+22.3'	108.9°	67°33.9'	+24.8'	111.2°	67°11.1'	+27.1'	113.5°	66°46.2'	+29.3'	115.6°	66°19.3'	+31.3'	117.7°	65°50.5'	+33.3'	119.6°	7
8	68°32.7'	+17.4'	104.0°	68°16.9'	+20.0'	106.5°	67°58.7'	+22.6'	108.8°	67°38.2'	+25.0'	111.1°	67°15.5'	+27.3'	113.4°	66°50.6'	+29.5'	115.5°	66°23.8'	+31.6'	117.6°	8
9	68°50.1'	+14.9'	101.4°	68°36.9'	+17.6'	103.9°	68°21.3'	+20.3'	106.3°	68°03.2'	+22.8'	108.7°	67°42.8'	+25.3'	111.0°	67°20.2'	+27.6'	113.3°	66°55.4'	+29.8'	115.4°	9
10	69°05.0'	+12.3'	98.7°	68°54.6'	+15.1'	101.3°	68°41.6'	+17.9'	103.8°	68°26.0'	+20.5'	106.2°	68°08.1'	+23.1'	108.6°	67°47.7'	+25.5'	111.0°	67°25.2'	+27.8'	113.2°	10
11	69°17.3'	+09.6'	95.9°	69°09.7'	+12.5'	98.5°	68°59.4'	+15.3'	101.1°	68°46.6'	+18.1'	103.7°	68°31.1'	+20.8'	106.1°	68°13.3'	+23.3'	108.5°	67°53.0'	+25.8'	110.9°	11
12	69°26.9'	+06.9'	93.1°	69°22.2'	+09.8'	95.8°	69°14.8'	+12.7'	98.4°	69°04.7'	+15.6'	101.0°	68°51.9'	+18.4'	103.5°	68°36.6'	+21.0'	106.0°	68°18.8'	+23.6'	108.5°	12
13	69°33.7'	+04.1'	90.3°	69°32.0'	+07.1'	93.0°	69°27.5'	+10.0'	95.6°	69°20.2'	+13.0'	98.3°	69°10.3'	+15.8'	100.9°	68°57.6'	+18.6'	103.4°	68°42.4'	+21.3'	105.9°	13
14	69°37.8'	+01.3'	87.4°	69°39.1'	+04.3'	90.1°	69°37.6'	+07.3'	92.8°	69°33.2'	+10.3'	95.5°	69°26.1'	+13.2'	98.2°	69°16.2'	+16.1'	100.8°	69°03.7'	+18.9'	103.3°	14
15	69°39.1'	-01.5'	84.6°	69°43.4'	+01.5'	87.3°	69°44.9'	+04.5'	90.0°	69°43.5'	+07.5'	92.7°	69°39.3'	+10.5'	95.4°	69°32.3'	+13.4'	98.0°	69°22.5'	+16.3'	100.7°	15
16	69°37.6'	-04.4'	81.7°	69°44.9'	-01.4'	84.4°	69°49.3'	+01.6'	87.1°	69°51.0'	+04.7'	89.8°	69°49.8'	+07.7'	92.5°	69°45.7'	+10.7'	95.2°	69°38.8'	+13.7'	97.9°	16
17	69°33.2'	-07.1'	78.8°	69°43.5'	-04.2'	81.5°	69°51.0'	-01.2'	84.2°	69°55.6'	+01.8'	86.9°	69°57.5'	+04.9'	89.6°	69°56.4'	+07.9'	92.4°	69°52.5'	+10.9'	95.1°	17
18	69°26.1'	-09.9'	76.0°	69°39.3'	-07.0'	78.6°	69°49.8'	-04.1'	81.3°	69°57.5'	-01.1'	84.0°	70°02.3'	+02.0'	86.7°	70°04.3'	+05.1'	89.5°	70°03.4'	+08.1'	92.2°	18
19	69°16.2'	-12.5'	73.2°	69°32.3'	-09.8'	75.8°	69°45.7'	-06.9'	78.4°	69°56.4'	-03.9'	81.1°	70°04.3'	-00.9'	83.8°	70°09.4'	+02.2'	86.5°	70°11.5'	+05.2'	89.3°	19
20	69°03.7'	-15.1'	70.4°	69°22.5'	-12.4'	72.9°	69°38.8'	-09.6'	75.5°	69°52.5'	-06.7'	78.2°	70°03.4'	-03.8'	80.9°	70°11.5'	-00.7'	83.6°	70°16.8'	+02.3'	86.4°	20
21	68°48.5'	-17.6'	67.8°	69°10.1'	-15.0'	7																

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

22° 338° LHA

Latitude SAME as Declination

22° 338° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	64°06.7'	+32.5'	120.9°	63°35.1'	+34.2'	122.6°	63°02.0'	+35.8'	124.3°	62°27.5'	+37.3'	125.9°	61°51.6'	+38.7'	127.4°	61°14.6'	+40.1'	128.9°	60°36.4'	+41.3'	130.2°	0
1	64°39.1'	+30.9'	119.0°	64°09.3'	+32.7'	120.8°	63°37.8'	+34.4'	122.5°	63°04.8'	+36.0'	124.2°	62°30.4'	+37.5'	125.8°	61°54.7'	+39.0'	127.3°	61°17.7'	+40.3'	128.8°	1
2	65°10.0'	+29.2'	116.9°	64°42.0'	+31.1'	118.8°	64°12.2'	+32.9'	120.7°	63°40.8'	+34.6'	122.4°	63°07.9'	+36.3'	124.1°	62°33.6'	+37.8'	125.7°	61°58.0'	+39.2'	127.2°	2
3	65°39.2'	+27.4'	114.8°	65°13.1'	+29.4'	116.8°	64°45.1'	+31.4'	118.7°	64°15.5'	+33.2'	120.5°	63°44.2'	+34.9'	122.3°	63°11.4'	+36.5'	124.0°	62°37.2'	+38.0'	125.6°	3
4	66°06.6'	+25.5'	112.7°	65°42.5'	+27.6'	114.7°	65°16.5'	+29.7'	116.7°	64°48.6'	+31.6'	118.6°	64°19.1'	+33.4'	120.4°	63°47.9'	+35.1'	122.2°	63°15.2'	+36.7'	123.9°	4
5	66°32.1'	+23.5'	110.4°	66°10.1'	+25.7'	112.5°	65°46.1'	+27.9'	114.6°	65°20.2'	+29.9'	116.6°	64°52.5'	+31.8'	118.5°	64°23.0'	+33.7'	120.3°	63°51.9'	+35.4'	122.1°	5
6	66°55.6'	+21.4'	108.1°	66°35.9'	+23.7'	110.3°	66°14.0'	+26.0'	112.4°	65°50.1'	+28.1'	114.5°	65°24.3'	+30.2'	116.5°	64°56.7'	+32.1'	118.4°	64°27.3'	+33.9'	120.2°	6
7	67°16.9'	+19.1'	105.7°	66°59.6'	+21.6'	108.0°	66°40.0'	+24.0'	110.2°	66°18.3'	+26.2'	112.3°	65°54.5'	+28.4'	114.4°	65°28.8'	+30.4'	116.4°	65°01.2'	+32.3'	118.3°	7
8	67°36.1'	+16.8'	103.2°	67°21.2'	+19.4'	105.5°	67°04.0'	+21.9'	107.8°	66°44.5'	+24.2'	110.0°	66°22.9'	+26.5'	112.2°	65°59.2'	+28.6'	114.3°	65°33.5'	+30.7'	116.3°	8
9	67°52.9'	+14.4'	100.7°	67°40.6'	+17.1'	103.1°	67°25.8'	+19.6'	105.4°	67°08.7'	+22.1'	107.7°	66°49.3'	+24.5'	109.9°	66°27.8'	+26.7'	112.1°	66°04.2'	+28.9'	114.2°	9
10	68°07.4'	+12.0'	98.1°	67°57.7'	+14.7'	100.5°	67°45.4'	+17.3'	102.9°	67°30.8'	+19.9'	105.3°	67°13.8'	+22.4'	107.6°	66°54.6'	+24.7'	109.8°	66°33.1'	+27.0'	112.0°	10
11	68°19.3'	+09.4'	95.4°	68°12.3'	+12.2'	97.9°	68°02.8'	+14.9'	100.4°	67°50.7'	+17.6'	102.8°	67°36.2'	+20.1'	105.2°	67°19.3'	+22.6'	107.5°	67°00.1'	+25.0'	109.7°	11
12	68°28.7'	+06.8'	92.8°	68°24.5'	+09.6'	95.3°	68°17.7'	+12.4'	97.8°	68°08.3'	+15.2'	100.3°	67°56.3'	+17.8'	102.7°	67°41.9'	+20.4'	105.1°	67°25.1'	+22.9'	107.4°	12
13	68°35.5'	+04.2'	90.0°	68°34.1'	+07.0'	92.6°	68°30.1'	+09.9'	95.1°	68°23.4'	+12.7'	97.6°	68°14.1'	+15.4'	100.1°	68°02.3'	+18.1'	102.6°	67°48.0'	+20.7'	105.0°	13
14	68°39.7'	+01.5'	87.3°	68°41.2'	+04.4'	89.9°	68°40.0'	+07.2'	92.4°	68°36.1'	+10.1'	95.0°	68°29.5'	+12.9'	97.5°	68°20.4'	+15.6'	100.0°	68°08.7'	+18.3'	102.5°	14
15	68°41.2'	-01.2'	84.6°	68°45.5'	+01.7'	87.1°	68°47.2'	+04.6'	89.7°	68°46.2'	+07.4'	92.3°	68°42.4'	+10.3'	94.8°	68°36.0'	+13.1'	97.4°	68°27.0'	+15.9'	99.9°	15
16	68°40.0'	-03.9'	81.8°	68°47.2'	-01.0'	84.4°	68°51.7'	+01.9'	86.9°	68°53.6'	+04.8'	89.5°	68°52.7'	+07.7'	92.1°	68°49.2'	+10.5'	94.7°	68°42.9'	+13.4'	97.3°	16
17	68°36.1'	-06.5'	79.1°	68°46.2'	-03.7'	81.6°	68°53.6'	-00.9'	84.2°	68°58.3'	+02.0'	86.7°	69°00.4'	+05.0'	89.3°	68°59.7'	+07.9'	92.0°	68°56.3'	+10.8'	94.6°	17
18	68°29.5'	-09.1'	76.4°	68°42.4'	-06.4'	78.8°	68°52.7'	-03.6'	81.4°	69°00.4'	-00.7'	84.0°	69°05.4'	+02.2'	86.6°	69°07.6'	+05.2'	89.2°	69°07.1'	+08.1'	91.8°	18
19	68°20.4'	-11.7'	73.7°	68°36.0'	-09.0'	76.1°	68°49.2'	-06.2'	78.6°	68°59.7'	-03.4'	81.2°	69°07.6'	-00.5'	83.8°	69°12.7'	+02.4'	86.4°	69°15.2'	+05.4'	89.0°	19
20	68°08.7'	-14.2'	71.0°	68°27.0'	-11.6'	73.4°	68°42.9'	-08.9'	75.9°	68°56.3'	-06.1'	78.4°	69°07.1'	-03.3'	81.0°	69°15.2'	-00.3'	83.6°	69°20.5'	+02.6'	86.2°	20
21	67°54.5'	-16.6'	68.4°	68°15.5'	-14.1'	70.8°	68°34.0'	-11.5'	73.2°	68°50.2'	-08.8'	75.6°	69°03.8'	-06.0'	78.2°	69°14.8'	-03.1'	80.7°	69°23.1'	-00.2'	83.4°	21
22	67°37.9'	-18.9'	65.9°	68°01.4'	-16.5'	68.1°	68°22.6'	-14.0'	70.5°	68°41.4'	-11.4'	72.9°	68°57.8'	-08.7'	75.4°	69°11.7'	-05.8'	77.9°	69°22.9'	-03.0'	80.5°	22
23	67°19.0'	-21.1'	63.4°	67°44.9'	-18.8'	65.6°	68°08.6'	-16.4'	67.9°	68°30.1'	-13.9'	70.2°	68°49.2'	-11.3'	72.6°	69°05.8'	-08.5'	75.1°	69°19.9'	-05.7'	77.7°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

22° 338° LHA

Latitude SAME as Declination

22° 338° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

23° 337° LHA

Latitude SAME as Declination

23° 337° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	63°16.4'	+31.5'	119.7°	62°45.9'	+33.2'	121.4°	62°14.0'	+34.8'	123.0°	61°40.6'	+36.4'	124.6°	61°05.9'	+37.8'	126.1°	60°30.0'	+39.1'	127.5°	59°52.9'	+40.4'	128.9°	0
1	63°47.9'	+30.0'	117.8°	63°19.1'	+31.8'	119.5°	62°48.8'	+33.5'	121.2°	62°17.0'	+35.1'	122.9°	61°43.7'	+36.6'	124.4°	61°09.1'	+38.0'	125.9°	60°33.3'	+39.4'	127.4°	1
2	64°17.9'	+28.3'	115.8°	63°50.9'	+30.2'	117.6°	63°22.3'	+32.0'	119.4°	62°52.0'	+33.7'	121.1°	62°20.3'	+35.3'	122.7°	61°47.1'	+36.8'	124.3°	61°12.7'	+38.3'	125.8°	2
3	64°46.2'	+26.5'	113.7°	64°21.1'	+28.5'	115.6°	63°54.2'	+30.4'	117.5°	63°25.7'	+32.2'	119.3°	62°55.6'	+33.9'	121.0°	62°24.0'	+35.6'	122.6°	61°50.9'	+37.1'	124.2°	3
4	65°12.7'	+24.7'	111.6°	64°49.6'	+26.8'	113.6°	64°24.7'	+28.8'	115.5°	63°58.0'	+30.7'	117.4°	63°29.5'	+32.5'	119.2°	62°59.5'	+34.2'	120.9°	62°28.0'	+35.8'	122.5°	4
5	65°37.4'	+22.7'	109.4°	65°16.4'	+24.9'	111.5°	64°53.5'	+27.0'	113.5°	64°28.6'	+29.0'	115.4°	64°02.0'	+30.9'	117.3°	63°33.7'	+32.7'	119.0°	63°03.8'	+34.5'	120.8°	5
6	66°00.1'	+20.7'	107.2°	65°41.3'	+23.0'	109.3°	65°20.5'	+25.2'	111.3°	64°57.7'	+27.3'	113.3°	64°33.0'	+29.3'	115.3°	64°06.5'	+31.2'	117.1°	63°38.3'	+33.0'	118.9°	6
7	66°20.8'	+18.5'	104.8°	66°04.3'	+20.9'	107.0°	65°45.7'	+23.2'	109.2°	65°25.0'	+25.4'	111.2°	65°02.3'	+27.5'	113.2°	64°37.7'	+29.6'	115.2°	64°11.3'	+31.5'	117.0°	7
8	66°39.3'	+16.3'	102.5°	66°25.2'	+18.8'	104.7°	66°08.9'	+21.2'	106.9°	65°50.4'	+23.5'	109.0°	65°29.8'	+25.7'	111.1°	65°07.2'	+27.8'	113.1°	64°42.7'	+29.8'	115.1°	8
9	66°55.7'	+14.0'	100.0°	66°44.0'	+16.6'	102.3°	66°30.1'	+19.1'	104.6°	66°13.9'	+21.5'	106.8°	65°55.5'	+23.8'	108.9°	65°35.0'	+26.0'	111.0°	65°12.6'	+28.1'	113.0°	9
10	67°09.7'	+11.7'	97.5°	67°00.6'	+14.3'	99.9°	66°49.2'	+16.8'	102.2°	66°35.3'	+19.3'	104.4°	66°19.3'	+21.7'	106.6°	66°01.0'	+24.0'	108.8°	65°40.7'	+26.2'	110.9°	10
11	67°21.3'	+09.2'	95.0°	67°14.9'	+11.9'	97.4°	67°06.0'	+14.5'	99.7°	66°54.7'	+17.1'	102.0°	66°41.0'	+19.6'	104.3°	66°25.0'	+22.0'	106.5°	66°06.9'	+24.3'	108.7°	11
12	67°30.6'	+06.7'	92.4°	67°26.8'	+09.5'	94.8°	67°20.5'	+12.1'	97.2°	67°11.7'	+14.8'	99.6°	67°00.6'	+17.3'	101.9°	66°47.0'	+19.8'	104.2°	66°31.2'	+22.3'	106.4°	12
13	67°37.3'	+04.2'	89.8°	67°36.2'	+07.0'	92.2°	67°32.6'	+09.7'	94.7°	67°26.5'	+12.4'	97.1°	67°17.9'	+15.0'	99.4°	67°06.9'	+17.6'	101.8°	66°53.5'	+20.1'	104.1°	13
14	67°41.5'	+01.7'	87.2°	67°43.2'	+04.4'	89.6°	67°42.3'	+07.2'	92.1°	67°38.9'	+09.9'	94.5°	67°32.9'	+12.6'	96.9°	67°24.5'	+15.3'	99.3°	67°13.6'	+17.9'	101.6°	14
15	67°43.2'	-00.9'	84.5°	67°47.6'	+01.9'	87.0°	67°49.5'	+04.6'	89.4°	67°48.8'	+07.4'	91.9°	67°45.6'	+10.2'	94.3°	67°39.7'	+12.9'	96.8°	67°31.4'	+15.5'	99.2°	15
16	67°42.3'	-03.4'	81.9°	67°49.5'	-00.7'	84.3°	67°54.1'	+02.1'	86.8°	67°56.2'	+04.9'	89.3°	67°55.7'	+07.6'	91.7°	67°52.6'	+10.4'	94.2°	67°47.0'	+13.1'	96.6°	16
17	67°38.9'	-06.0'	79.3°	67°48.8'	-03.3'	81.7°	67°56.2'	-00.5'	84.1°	68°01.1'	+02.3'	86.6°	68°03.3'	+05.1'	89.1°	68°03.0'	+07.9'	91.6°	68°00.1'	+10.6'	94.0°	17
18	67°32.9'	-08.5'	76.7°	67°45.6'	-05.8'	79.0°	67°55.7'	-03.1'	81.5°	68°03.3'	-00.3'	83.9°	68°08.4'	+02.5'	86.4°	68°10.9'	+05.3'	88.9°	68°10.7'	+08.1'	91.4°	18
19	67°24.5'	-10.9'	74.1°	67°39.7'	-08.3'	76.4°	67°52.6'	-05.7'	78.8°	68°03.0'	-02.9'	81.2°	68°10.9'	-00.2'	83.7°	68°16.1'	+02.7'	86.2°	68°18.8'	+05.5'	88.7°	19
20	67°13.6'	-13.3'	71.5°	67°31.4'	-10.8'	73.8°	67°47.0'	-08.2'	76.2°	68°00.1'	-05.5'	78.6°	68°10.7'	-02.8'	81.0°	68°18.8'	+00.0'	83.5°	68°24.3'	+02.8'	86.0°	20
21	67°00.3'	-15.6'	69.0°	67°20.7'	-13.2'	71.3°																

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

24° 336° LHA

Latitude SAME as Declination

24° 336° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	62°25.5'	+30.6'	118.5°	61°56.1'	+32.3'	120.2°	61°25.2'	+33.9'	121.8°	60°53.0'	+35.4'	123.3°	60°19.4'	+36.9'	124.8°	59°44.6'	+38.2'	126.2°	59°08.6'	+39.5'	127.5°	0
1	62°56.1'	+29.1'	116.6°	62°28.4'	+30.9'	118.4°	61°59.2'	+32.6'	120.0°	61°28.4'	+34.2'	121.6°	60°56.3'	+35.7'	123.2°	60°22.8'	+37.1'	124.6°	59°48.1'	+38.5'	126.0°	1
2	63°25.2'	+27.4'	114.7°	62°59.3'	+29.3'	116.5°	62°31.7'	+31.1'	118.2°	62°02.6'	+32.8'	119.9°	61°32.0'	+34.4'	121.5°	61°00.0'	+35.9'	123.0°	60°26.6'	+37.4'	124.5°	2
3	63°52.7'	+25.7'	112.7°	63°28.6'	+27.7'	114.6°	63°02.8'	+29.6'	116.3°	62°35.4'	+31.4'	118.1°	62°06.4'	+33.1'	119.7°	61°35.9'	+34.7'	121.4°	61°03.9'	+36.2'	122.9°	3
4	64°18.4'	+23.9'	110.6°	63°56.3'	+26.0'	112.6°	63°32.4'	+28.0'	114.4°	63°06.7'	+29.8'	116.2°	62°39.4'	+31.6'	117.9°	62°10.5'	+33.3'	119.6°	61°40.1'	+34.9'	121.2°	4
5	64°42.3'	+22.0'	108.5°	64°22.3'	+24.2'	110.5°	64°00.3'	+26.2'	112.4°	63°36.6'	+28.2'	114.3°	63°11.0'	+30.1'	116.1°	62°43.8'	+31.9'	117.8°	62°15.0'	+33.6'	119.5°	5
6	65°04.3'	+20.1'	106.3°	64°46.5'	+22.3'	108.4°	64°26.6'	+24.4'	110.3°	64°04.8'	+26.5'	112.3°	63°41.1'	+28.5'	114.1°	63°15.7'	+30.4'	116.0°	62°48.6'	+32.2'	117.7°	6
7	65°24.4'	+18.0'	104.1°	65°08.8'	+20.3'	106.2°	64°51.0'	+22.6'	108.2°	64°31.3'	+24.7'	110.2°	64°09.6'	+26.8'	112.1°	63°46.1'	+28.8'	114.0°	63°20.8'	+30.6'	115.9°	7
8	65°42.4'	+15.9'	101.8°	65°29.1'	+18.3'	103.9°	65°13.6'	+20.6'	106.0°	64°56.0'	+22.8'	108.1°	64°36.4'	+25.0'	110.1°	64°14.8'	+27.1'	112.0°	63°51.4'	+29.0'	113.9°	8
9	65°58.3'	+13.7'	99.4°	65°47.3'	+16.1'	101.6°	65°34.2'	+18.5'	103.8°	65°18.8'	+20.8'	105.9°	65°01.4'	+23.1'	107.9°	64°41.9'	+25.3'	110.0°	64°20.5'	+27.3'	111.9°	9
10	66°11.9'	+11.4'	97.0°	66°03.5'	+13.9'	99.2°	65°52.7'	+16.4'	101.4°	65°39.7'	+18.8'	103.6°	65°24.5'	+21.1'	105.7°	65°07.2'	+23.4'	107.8°	64°47.8'	+25.5'	109.8°	10
11	66°23.3'	+9.1'	94.6°	66°17.4'	+11.6'	96.8°	66°09.1'	+14.2'	99.1°	65°58.5'	+16.6'	101.3°	65°45.6'	+19.1'	103.5°	65°30.5'	+21.4'	105.6°	65°13.3'	+23.7'	107.7°	11
12	66°32.4'	+6.7'	92.1°	66°29.0'	+9.3'	94.4°	66°23.2'	+11.9'	96.7°	66°15.1'	+14.4'	98.9°	66°04.7'	+16.9'	101.1°	65°51.9'	+19.3'	103.3°	65°37.0'	+21.7'	105.5°	12
13	66°39.1'	+4.3'	89.6°	66°38.3'	+6.9'	91.9°	66°35.1'	+9.5'	94.2°	66°29.5'	+12.1'	96.5°	66°21.6'	+14.7'	98.8°	66°11.3'	+17.2'	101.0°	65°58.7'	+19.6'	103.2°	13
14	66°43.4'	+1.9'	87.1°	66°45.2'	+4.5'	89.4°	66°44.7'	+7.2'	91.7°	66°41.7'	+9.8'	94.0°	66°36.2'	+12.4'	96.3°	66°28.4'	+14.9'	98.6°	66°18.3'	+17.4'	100.9°	14
15	66°45.2'	-0.6'	84.5°	66°49.8'	+2.1'	86.9°	66°51.8'	+4.7'	89.2°	66°51.5'	+7.4'	91.5°	66°48.6'	+10.0'	93.9°	66°43.4'	+12.6'	96.2°	66°35.7'	+15.2'	98.5°	15
16	66°44.7'	-3.0'	82.0°	66°51.8'	-0.4'	84.3°	66°56.6'	+2.3'	86.6°	66°58.8'	+5.0'	89.0°	66°58.7'	+7.6'	91.4°	66°56.0'	+10.3'	93.7°	66°50.9'	+12.9'	96.0°	16
17	66°41.7'	-5.4'	79.5°	66°51.5'	-2.8'	81.8°	66°58.8'	-0.2'	84.1°	67°03.8'	+2.5'	86.4°	67°06.3'	+5.2'	88.8°	67°06.3'	+7.8'	91.2°	67°03.8'	+10.5'	93.5°	17
18	66°36.2'	-7.8'	77.0°	66°48.6'	-5.3'	79.2°	66°58.7'	-2.6'	81.5°	67°06.3'	+0.0'	83.9°	67°11.4'	+2.7'	86.2°	67°14.1'	+5.4'	88.6°	67°14.3'	+8.1'	91.0°	18
19	66°28.4'	-10.2'	74.5°	66°43.4'	-7.7'	76.7°	66°56.0'	-5.1'	79.0°	67°06.3'	-2.5'	81.3°	67°14.1'	+0.2'	83.7°	67°19.5'	+2.9'	86.0°	67°22.4'	+5.6'	88.4°	19
20	66°18.3'	-12.5'	72.0°	66°35.7'	-10.0'	74.2°	66°50.9'	-7.5'	76.4°	67°03.8'	-4.9'	78.7°	67°14.3'	-2.3'	81.1°	67°22.4'	+0.4'	83.4°	67°28.0'	+3.1'	85.8°	20
21	66°05.8'	-14.7'	69.6°	66°25.7'	-12.3'	71.7°	66°43.4'	-9.9'	73.9°	66°58.9'	-7.4'	76.2°	67°12.0'	-0.4'	78.5°	67°22.8'	-2.1'	80.8°	67°31.1'	+0.6'	83.2°	21
22	65°51.1'	-16.9'	67.2°	66°13.4'	-14.6'	69.3°	66°33.5'	-12.2'	71.4°	66°51.5'	-9.8'	73.7°	67°07.3'	-0.2'	75.9°	67°20.7'	-4.6'	78.3°	67°31.7'	-2.0'	80.6°	22
23	65°34.2'	-19.0'	64.9°	65°58.8'	-16.8'	66.9°	66°21.3'	-14.5'	69.0°	66°41.7'	-12.1'	71.2°	67°00.0'	-0.9'	73.4°	67°16.0'	-7.1'	75.7°	67°29.7'	-4.5'	78.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

24° 336° LHA

Latitude SAME as Declination

24° 336° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

25° 335° LHA

Latitude SAME as Declination

25° 335° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	61°34.1'	+29.8'	117.4°	61°05.7'	+31.4'	119.0°	60°35.9'	+33.0'	120.6°	60°04.7'	+34.6'	122.1°	59°32.2'	+36.0'	123.5°	58°58.4'	+37.4'	124.9°	58°23.5'	+38.7'	126.3°	0
1	62°03.9'	+28.2'	115.6°	61°37.2'	+30.0'	117.3°	61°08.9'	+31.7'	118.9°	60°39.2'	+33.3'	120.4°	60°08.2'	+34.8'	121.9°	59°35.8'	+36.3'	123.4°	59°02.2'	+37.6'	124.8°	1
2	62°32.1'	+26.7'	113.7°	62°07.2'	+28.5'	115.4°	61°40.6'	+30.3'	117.1°	61°12.5'	+31.9'	118.7°	60°43.0'	+33.5'	120.3°	60°12.0'	+35.1'	121.8°	59°39.8'	+36.5'	123.3°	2
3	62°58.8'	+25.0'	111.7°	62°35.7'	+26.9'	113.5°	62°10.9'	+28.8'	115.3°	61°44.5'	+30.5'	116.9°	61°16.5'	+32.2'	118.6°	60°47.1'	+33.8'	120.2°	60°16.3'	+35.3'	121.7°	3
4	63°23.7'	+23.2'	109.7°	63°02.6'	+25.2'	111.6°	62°39.7'	+27.2'	113.4°	62°15.0'	+29.0'	115.1°	61°48.7'	+30.8'	116.8°	61°20.9'	+32.5'	118.4°	60°51.6'	+34.1'	120.0°	4
5	63°47.0'	+21.4'	107.6°	63°27.8'	+23.5'	109.5°	63°06.8'	+25.5'	111.4°	62°44.0'	+27.4'	113.2°	62°19.5'	+29.3'	115.0°	61°53.4'	+31.1'	116.7°	61°25.7'	+32.8'	118.3°	5
6	64°08.4'	+19.5'	105.5°	63°51.3'	+21.7'	107.5°	63°32.3'	+23.8'	109.4°	63°11.5'	+25.8'	111.3°	62°48.8'	+27.7'	113.1°	62°24.5'	+29.6'	114.8°	61°58.5'	+31.4'	116.6°	6
7	64°27.8'	+17.5'	103.3°	64°13.0'	+19.8'	105.3°	63°56.1'	+21.9'	107.3°	63°37.3'	+24.0'	109.2°	63°16.6'	+26.1'	111.1°	62°54.1'	+28.0'	113.0°	62°29.8'	+29.9'	114.7°	7
8	64°45.3'	+15.4'	101.1°	64°32.7'	+17.8'	103.2°	64°18.0'	+20.0'	105.2°	64°01.3'	+22.2'	107.2°	63°42.6'	+24.3'	109.1°	63°22.1'	+26.3'	111.0°	62°59.7'	+28.3'	112.8°	8
9	65°00.8'	+13.3'	98.8°	64°50.5'	+15.7'	100.9°	64°38.1'	+18.0'	103.0°	64°23.5'	+20.3'	105.0°	64°07.0'	+22.5'	107.0°	63°48.4'	+24.6'	109.0°	63°28.0'	+26.6'	110.9°	9
10	65°14.1'	+11.2'	96.5°	65°06.2'	+13.6'	98.6°	64°56.1'	+16.0'	100.8°	64°43.8'	+18.3'	102.8°	64°29.4'	+20.6'	104.9°	64°13.0'	+22.8'	106.9°	63°54.6'	+24.9'	108.8°	10
11	65°25.3'	+8.9'	94.1°	65°19.8'	+11.4'	96.3°	65°12.1'	+13.9'	98.5°	65°02.1'	+16.2'	100.6°	64°50.0'	+18.6'	102.7°	64°35.8'	+20.9'	104.8°	64°19.5'	+23.1'	106.8°	11
12	65°34.2'	+6.7'	91.8°	65°31.2'	+9.2'	94.0°	65°25.9'	+11.7'	96.1°	65°18.4'	+14.1'	98.3°	65°08.6'	+16.5'	100.4°	64°56.6'	+18.9'	102.6°	64°42.5'	+21.1'	104.6°	12
13	65°40.9'	+4.4'	89.4°	65°40.4'	+6.9'	91.6°	65°37.6'	+9.4'	93.8°	65°32.5'	+11.9'	96.0°	65°25.1'	+14.4'	98.1°	65°15.5'	+16.8'	100.3°	65°03.7'	+19.1'	102.4°	13
14	65°45.2'	+2.1'	86.9°	65°47.3'	+4.6'	89.2°	65°47.0'	+7.1'	91.4°	65°44.4'	+9.7'	93.6°	65°39.5'	+12.2'	95.8°	65°32.3'	+14.7'	98.0°	65°22.8'	+17.1'	100.2°	14
15	65°47.3'	-0.3'	84.5°	65°51.9'	+2.3'	86.7°	65°54.2'	+4.8'	88.9°	65°54.1'	+7.4'	91.2°	65°51.7'	+9.9'	93.4°	65°47.0'	+12.4'	95.6°	65°39.9'	+14.9'	97.8°	15
16	65°47.0'	-2.6'	82.1°	65°54.2'	-0.1'	84.3°	65°59.0'	+2.5'	86.5°	66°01.5'	+5.1'	88.7°	66°01.6'	+7.6'	91.0°	65°59.4'	+10.2'	93.2°	65°54.8'	+12.7'	95.5°	16
17	65°44.4'	-4.9'	79.6°	65°54.1'	-2.4'	81.8°	66°01.5'	+0.1'	84.0°	66°06.5'	+2.7'	86.3°	66°09.2'	+5.3'	88.5°	66°09.6'	+7.9'	90.8°	66°07.5'	+10.4'	93.1°	17
18	65°39.5'	-7.2'	77.2°	65°51.7'	-4.7'	79.4°	66°01.6'	-2.2'	81.6°	66°09.2'	+0.3'	83.8°	66°14.5'	+2.9'	86.1°	66°17.4'	+5.5'	88.4°	66°18.0'	+8.1'	90.6°	18
19	65°32.3'	-9.5'	74.8°	65°47.0'	-7.0'	76.9°	65°59.4'	-4.6'	79.1°	66°09.6'	-2.0'	81.3°	66°17.4'	+0.0'	83.6°	66°22.9'	+3.1'	85.9°	66°26.1'	+5.7'	88.2°	19
20	65°22.8'	-11.7'	72.4°	65°39.9'	-9.3'	74.5°	65°54.8'	-6.9'	76.7°	66°07.5'	-4.4'	78.9°	66°18.0'	-1.9'	81.1°	66°26.1'	+0.7'	83.4°	66°31.8'	+3.3'	85.7°	20
21	65°11.2'	-13.8'	70.1°	65°30.6'	-11.5'	72.1°	65°47.9'	-9.2'	74.3°	66°03.1'	-6.7'	76.4°	66°16.1'	-4.2'	78.6°	66°26.8'	-1.7'</					

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

26° 334° LHA

Latitude SAME as Declination

26° 334° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	60°42.2'	+28.9'	116.4°	60°14.8'	+30.6'	118.0°	59°46.0'	+32.2'	119.5°	59°15.8'	+33.7'	120.9°	58°44.3'	+35.2'	122.4°	58°11.6'	+36.5'	123.7°	57°37.7'	+37.8'	125.0°	0
1	61°11.1'	+27.5'	114.6°	60°45.4'	+29.2'	116.2°	60°18.2'	+30.9'	117.8°	59°49.5'	+32.5'	119.3°	59°19.4'	+34.0'	120.8°	58°48.1'	+35.4'	122.2°	58°15.5'	+36.8'	123.6°	1
2	61°38.6'	+25.9'	112.7°	61°14.6'	+27.7'	114.4°	60°49.0'	+29.5'	116.0°	60°22.0'	+31.1'	117.6°	59°53.4'	+32.7'	119.2°	59°23.5'	+34.2'	120.6°	58°52.3'	+35.7'	122.1°	2
3	62°04.5'	+24.3'	110.8°	61°42.3'	+26.2'	112.5°	61°18.5'	+28.0'	114.2°	60°53.1'	+29.7'	115.9°	60°26.2'	+31.4'	117.5°	59°57.8'	+33.0'	119.0°	59°28.0'	+34.5'	120.5°	3
4	62°28.8'	+22.6'	108.8°	62°08.5'	+24.5'	110.6°	61°46.5'	+26.5'	112.4°	61°22.8'	+28.3'	114.1°	60°57.6'	+30.0'	115.7°	60°30.8'	+31.7'	117.3°	60°02.5'	+33.3'	118.9°	4
5	62°51.4'	+20.8'	106.8°	62°33.1'	+22.8'	108.7°	62°13.0'	+24.8'	110.5°	61°51.1'	+26.7'	112.2°	61°27.6'	+28.6'	113.9°	61°02.5'	+30.3'	115.6°	60°35.8'	+32.0'	117.2°	5
6	63°12.2'	+19.0'	104.8°	62°55.9'	+21.1'	106.7°	62°37.8'	+23.1'	108.5°	62°17.9'	+25.1'	110.3°	61°56.2'	+27.0'	112.1°	61°32.8'	+28.8'	113.8°	61°07.8'	+30.6'	115.5°	6
7	63°31.1'	+17.0'	102.6°	63°17.0'	+19.2'	104.6°	63°00.9'	+21.4'	106.5°	62°43.0'	+23.4'	108.3°	62°23.2'	+25.4'	110.2°	62°01.6'	+27.3'	111.9°	61°38.4'	+29.1'	113.7°	7
8	63°48.2'	+15.1'	100.5°	63°36.2'	+17.3'	102.5°	63°22.3'	+19.5'	104.4°	63°06.4'	+21.6'	106.3°	62°48.6'	+23.7'	108.2°	62°28.9'	+25.7'	110.0°	62°07.5'	+27.6'	111.8°	8
9	64°03.2'	+13.0'	98.3°	63°53.5'	+15.3'	100.3°	63°41.8'	+17.6'	102.3°	63°28.0'	+19.8'	104.2°	63°12.3'	+21.9'	106.2°	62°54.6'	+24.0'	108.1°	62°35.1'	+26.0'	109.9°	9
10	64°16.3'	+10.9'	96.0°	64°08.9'	+13.3'	98.1°	63°59.4'	+15.6'	100.1°	63°47.8'	+17.9'	102.1°	63°34.2'	+20.1'	104.1°	63°18.6'	+22.2'	106.0°	63°01.1'	+24.3'	107.9°	10
11	64°27.2'	+08.8'	93.8°	64°22.2'	+11.2'	95.8°	64°15.0'	+13.6'	97.9°	64°05.7'	+15.9'	99.9°	63°54.3'	+18.2'	102.0°	63°40.8'	+20.4'	103.9°	63°25.4'	+22.5'	105.9°	11
12	64°36.0'	+06.6'	91.5°	64°33.4'	+09.1'	93.6°	64°28.6'	+11.5'	95.7°	64°21.6'	+13.8'	97.7°	64°12.4'	+16.2'	99.8°	64°01.2'	+18.4'	101.8°	63°47.9'	+20.7'	103.8°	12
13	64°42.7'	+04.5'	89.1°	64°42.5'	+06.9'	91.3°	64°40.0'	+09.3'	93.4°	64°35.4'	+11.7'	95.5°	64°28.6'	+14.1'	97.6°	64°19.6'	+16.4'	99.6°	64°08.5'	+18.7'	101.7°	13
14	64°47.1'	+02.2'	86.8°	64°49.3'	+04.7'	88.9°	64°49.4'	+07.1'	91.1°	64°47.1'	+09.6'	93.2°	64°42.7'	+12.0'	95.3°	64°36.1'	+14.4'	97.4°	64°27.3'	+16.7'	99.5°	14
15	64°49.3'	+00.0'	84.5°	64°54.0'	+02.5'	86.6°	64°56.5'	+04.9'	88.7°	64°56.7'	+07.4'	90.9°	64°54.7'	+09.8'	93.0°	64°50.5'	+12.3'	95.1°	64°44.0'	+14.7'	97.2°	15
16	64°49.4'	-02.2'	82.1°	64°56.5'	+00.2'	84.2°	65°01.4'	+02.7'	86.4°	65°04.1'	+05.2'	88.5°	65°04.6'	+07.6'	90.7°	65°02.7'	+10.1'	92.8°	64°58.7'	+12.5'	94.9°	16
17	64°47.1'	-04.4'	79.8°	64°56.7'	-02.0'	81.9°	65°04.1'	+00.4'	84.0°	65°09.3'	+02.9'	86.1°	65°12.2'	+05.4'	88.3°	65°12.8'	+07.9'	90.5°	65°11.2'	+10.4'	92.6°	17
18	64°42.7'	-06.6'	77.4°	64°54.7'	-04.2'	79.5°	65°04.6'	-01.8'	81.6°	65°12.2'	+00.6'	83.8°	65°17.6'	+03.1'	85.9°	65°20.7'	+05.6'	88.1°	65°21.6'	+08.1'	90.3°	18
19	64°36.1'	-08.8'	75.1°	64°50.5'	-06.5'	77.2°	65°02.7'	-04.1'	79.2°	65°12.8'	-01.6'	81.4°	65°20.7'	+00.9'	83.5°	65°26.4'	+03.4'	85.7°	65°29.7'	+05.9'	87.9°	19
20	64°27.3'	-10.9'	72.8°	64°44.0'	-08.6'	74.8°	64°58.7'	-06.3'	76.9°	65°11.2'	-03.9'	79.0°	65°21.6'	-01.4'	81.1°	65°29.7'	+01.1'	83.3°	65°35.6'	+03.6'	85.5°	20
21	64°16.4'	-13.0'	70.5°	64°35.4'	-10.8'	72.5°	64°52.4'	-08.5'	74.5°	65°07.3'	-06.1'	76.6°	65°20.2'	-03.7'	78.7°	65°30.8'	-01.2'	80.9°	65°39.2'	+01.3'	83.1°	21
22	64°03.3'	-15.0'	68.3°	64°24.6'	-12.9'	70.2°	64°43.9'	-10.6'	72.2°	65°01.2'	-08.3'	74.3°	65°16.5'	-06.0'	76.3°	65°29.5'	-03.5'	78.5°	65°40.4'	-01.1'	80.6°	22
23	63°48.3'	-17.0'	66.1°	64°11.7'	-14.9'	68.0°	64°33.3'	-12.8'	69.9°	64°52.9'	-10.5'	71.9°	65°10.5'	-08.2'	74.0°	65°26.0'	-05.8'	76.1°	65°39.4'	-03.4'	78.2°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

26° 334° LHA

Latitude SAME as Declination

26° 334° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

27° 333° LHA

Latitude SAME as Declination

27° 333° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	59°49.8'	+28.2'	115.4°	59°23.4'	+29.8'	116.9°	58°55.5'	+31.4'	118.4°	58°26.3'	+32.9'	119.8°	57°55.8'	+34.4'	121.2°	57°24.1'	+35.7'	122.6°	56°51.2'	+37.0'	123.9°	0
1	60°18.0'	+26.7'	113.6°	59°53.2'	+28.5'	115.2°	59°26.9'	+30.1'	116.7°	58°59.2'	+31.7'	118.2°	58°30.1'	+33.2'	119.7°	57°59.8'	+34.6'	121.1°	57°28.2'	+36.0'	122.4°	1
2	60°44.7'	+25.2'	111.8°	60°21.6'	+27.0'	113.4°	59°57.0'	+28.7'	115.0°	59°30.9'	+30.4'	116.6°	59°03.3'	+32.0'	118.1°	58°34.4'	+33.5'	119.5°	58°04.2'	+34.9'	120.9°	2
3	61°09.9'	+23.6'	109.9°	60°48.6'	+25.5'	111.6°	60°25.7'	+27.3'	113.3°	60°01.3'	+29.0'	114.9°	59°35.3'	+30.7'	116.4°	59°07.9'	+32.2'	117.9°	58°39.1'	+33.7'	119.4°	3
4	61°33.6'	+22.0'	108.0°	61°14.1'	+23.9'	109.8°	60°53.0'	+25.8'	111.5°	60°30.3'	+27.6'	113.1°	60°05.9'	+29.3'	114.7°	59°40.1'	+30.9'	116.3°	59°12.9'	+32.5'	117.8°	4
5	61°55.5'	+20.2'	106.1°	61°38.0'	+22.3'	107.8°	61°18.8'	+24.2'	109.6°	60°57.8'	+26.1'	111.3°	60°35.2'	+27.9'	112.9°	60°11.1'	+29.6'	114.5°	59°45.4'	+31.2'	116.1°	5
6	62°15.8'	+18.5'	104.0°	62°00.3'	+20.5'	105.9°	61°43.0'	+22.5'	107.7°	61°23.9'	+24.5'	109.4°	61°03.1'	+26.4'	111.1°	60°40.7'	+28.2'	112.8°	60°16.6'	+29.9'	114.4°	6
7	62°34.2'	+16.6'	102.0°	62°20.8'	+18.7'	103.9°	62°05.5'	+20.8'	105.7°	61°48.4'	+22.8'	107.5°	61°29.5'	+24.8'	109.3°	61°08.8'	+26.6'	111.0°	60°46.5'	+28.5'	112.6°	7
8	62°50.9'	+14.7'	99.9°	62°39.6'	+16.9'	101.8°	62°26.3'	+19.0'	103.7°	62°11.2'	+21.1'	105.5°	61°54.2'	+23.1'	107.3°	61°35.5'	+25.1'	109.1°	61°15.0'	+27.0'	110.8°	8
9	63°05.6'	+12.8'	97.8°	62°56.5'	+15.0'	99.7°	62°45.4'	+17.2'	101.6°	62°32.3'	+19.3'	103.5°	62°17.3'	+21.4'	105.4°	62°00.5'	+23.4'	107.2°	61°41.9'	+25.4'	109.0°	9
10	63°18.3'	+10.8'	95.6°	63°11.5'	+13.0'	97.6°	63°02.5'	+15.3'	99.5°	62°51.6'	+17.5'	101.4°	62°38.8'	+19.6'	103.3°	62°24.0'	+21.7'	105.2°	62°07.3'	+23.7'	107.0°	10
11	63°29.1'	+08.7'	93.4°	63°24.5'	+11.0'	95.4°	63°17.8'	+13.3'	97.4°	63°09.1'	+15.6'	99.3°	62°58.4'	+17.8'	101.3°	62°45.7'	+19.9'	103.2°	62°31.0'	+22.0'	105.1°	11
12	63°37.8'	+06.6'	91.2°	63°35.5'	+09.0'	93.2°	63°31.1'	+11.3'	95.2°	63°24.7'	+13.6'	97.2°	63°16.1'	+15.9'	99.2°	63°05.6'	+18.1'	101.1°	62°53.0'	+20.2'	103.0°	12
13	63°44.5'	+04.5'	88.9°	63°44.5'	+06.9'	91.0°	63°42.4'	+09.2'	93.0°	63°38.3'	+11.6'	95.0°	63°32.0'	+13.9'	97.0°	63°23.6'	+16.1'	99.0°	63°13.3'	+18.4'	100.9°	13
14	63°49.0'	+02.4'	86.7°	63°51.4'	+04.8'	88.7°	63°51.7'	+07.2'	90.7°	63°49.8'	+09.5'	92.8°	63°45.9'	+11.8'	94.8°	63°39.8'	+14.2'	96.8°	63°31.6'	+16.4'	98.8°	14
15	63°51.4'	+00.3'	84.4°	63°56.2'	+02.7'	86.4°	63°58.8'	+05.0'	88.5°	63°59.4'	+07.4'	90.5°	63°57.7'	+09.8'	92.6°	63°53.9'	+12.1'	94.6°	63°48.0'	+14.4'	96.7°	15
16	63°51.7'	-01.8'	82.1°	63°58.8'	+00.5'	84.2°	64°03.9'	+02.9'	86.2°	64°06.8'	+05.3'	88.3°	64°07.5'	+07.7'	90.3°	64°06.1'	+10.0'	92.4°	64°02.5'	+12.4'	94.4°	16
17	63°49.8'	-04.0'	79.9°	63°59.4'	-01.6'	81.9°	64°06.8'	+00.7'	83.9°	64°12.0'	+03.1'	86.0°	64°15.2'	+05.5'	88.1°	64°16.1'	+07.9'	90.1°	64°14.9'	+10.3'	92.2°	17
18	63°45.9'	-06.1'	77.6°	63°57.7'	-03.8'	79.6°	64°07.5'	-01.4'	81.6°	64°15.2'	+01.0'	83.7°	64°20.7'	+03.4'	85.8°	64°24.0'	+05.8'	87.8°	64°25.2'	+08.2'	89.9°	18
19	63°39.8'	-08.2'	75.4°	63°53.9'	-05.9'	77.3°	64°06.1'	-03.6'	79.3°	64°16.1'	-01.2'	81.4°	64°24.0'	+01.2'	83.4°	64°29.8'	+03.6'	85.5°	64°33.4'	+06.0'	87.6°	19
20	63°31.6'	-10.2'	73.1°	63°48.0'	-08.0'	75.1°	64°02.5'	-05.7'	77.1°	64°14.9'	-03.4'	79.1°	64°25.2'	-01.0'	81.1°	64°33.4'	+01.4'	83.2°	64°39.4'	+03.8'	85.3°	20
21	63°21.4'	-12.2'	70.9°	63°40.0'	-10.1'	72.8°	63°56.8'	-07.8'	74.8°	64°11.5'	-05.5'	76.8°	64°									

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

28° 332° LHA

Latitude SAME as Declination

28° 332° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	58°57.0'	+27.5'	114.5°	58°31.5'	+29.1'	116.0°	58°04.5'	+30.7'	117.4°	57°36.3'	+32.2'	118.8°	57°06.7'	+33.6'	120.2°	56°36.0'	+35.0'	121.5°	56°04.1'	+36.3'	122.8°	0
1	59°24.5'	+26.0'	112.7°	59°00.5'	+27.7'	114.3°	58°35.2'	+29.4'	115.8°	58°08.4'	+30.9'	117.2°	57°40.3'	+32.4'	118.6°	57°10.9'	+33.9'	120.0°	56°40.3'	+35.2'	121.3°	1
2	59°50.5'	+24.6'	110.9°	59°28.3'	+26.3'	112.5°	59°04.5'	+28.0'	114.1°	58°39.3'	+29.7'	115.6°	58°12.7'	+31.2'	117.0°	57°44.8'	+32.7'	118.5°	57°15.6'	+34.2'	119.8°	2
3	60°15.1'	+23.0'	109.1°	59°54.6'	+24.8'	110.8°	59°32.6'	+26.6'	112.3°	59°09.0'	+28.3'	113.9°	58°44.0'	+29.9'	115.4°	58°17.5'	+31.5'	116.9°	57°49.7'	+33.0'	118.3°	3
4	60°38.1'	+21.4'	107.2°	60°19.4'	+23.3'	108.9°	59°59.2'	+25.1'	110.6°	59°37.3'	+26.9'	112.2°	59°13.9'	+28.6'	113.7°	58°49.0'	+30.2'	115.2°	58°22.7'	+31.8'	116.7°	4
5	60°59.5'	+19.7'	105.3°	60°42.7'	+21.7'	107.1°	60°24.3'	+23.6'	108.7°	60°04.2'	+25.4'	110.4°	59°42.5'	+27.2'	112.0°	59°19.3'	+28.9'	113.6°	58°54.6'	+30.5'	115.1°	5
6	61°19.2'	+18.0'	103.4°	61°04.4'	+20.0'	105.1°	60°47.9'	+22.0'	106.9°	60°29.6'	+23.9'	108.6°	60°09.7'	+25.7'	110.2°	59°48.2'	+27.5'	111.8°	59°25.1'	+29.2'	113.4°	6
7	61°37.2'	+16.2'	101.4°	61°24.5'	+18.3'	103.2°	61°09.9'	+20.3'	104.9°	60°53.5'	+22.3'	106.7°	60°35.4'	+24.2'	108.4°	60°15.7'	+26.0'	110.1°	59°54.3'	+27.8'	111.7°	7
8	61°53.5'	+14.4'	99.3°	61°42.8'	+16.5'	101.2°	61°30.2'	+18.6'	103.0°	61°15.8'	+20.6'	104.8°	60°59.6'	+22.6'	106.5°	60°41.7'	+24.5'	108.2°	60°22.1'	+26.3'	109.9°	8
9	62°07.9'	+12.5'	97.3°	61°59.3'	+14.7'	99.1°	61°48.8'	+16.8'	101.0°	61°36.4'	+18.9'	102.8°	61°22.2'	+20.9'	104.6°	61°06.2'	+22.9'	106.3°	60°48.5'	+24.8'	108.1°	9
10	62°20.4'	+10.6'	95.2°	62°14.0'	+12.8'	97.1°	62°05.6'	+15.0'	98.9°	61°55.3'	+17.1'	100.8°	61°43.1'	+19.2'	102.6°	61°29.1'	+21.2'	104.4°	61°13.3'	+23.2'	106.2°	10
11	62°31.0'	+08.6'	93.0°	62°26.8'	+10.9'	95.0°	62°20.6'	+13.1'	96.9°	62°12.4'	+15.3'	98.8°	62°02.3'	+17.4'	100.6°	61°50.3'	+19.5'	102.5°	61°36.5'	+21.5'	104.3°	11
12	62°39.6'	+06.6'	90.9°	62°37.7'	+08.9'	92.8°	62°33.7'	+11.2'	94.8°	62°27.7'	+13.4'	96.7°	62°19.8'	+15.6'	98.6°	62°09.9'	+17.7'	100.4°	61°58.0'	+19.8'	102.3°	12
13	62°46.2'	+04.6'	88.7°	62°46.6'	+06.9'	90.7°	62°44.8'	+09.2'	92.6°	62°41.1'	+11.4'	94.6°	62°35.3'	+13.7'	96.5°	62°27.6'	+15.9'	98.4°	62°17.8'	+18.0'	100.3°	13
14	62°50.9'	+02.6'	86.5°	62°53.5'	+04.9'	88.5°	62°54.0'	+07.2'	90.5°	62°52.5'	+09.5'	92.4°	62°49.0'	+11.7'	94.4°	62°43.4'	+14.0'	96.3°	62°35.9'	+16.2'	98.2°	14
15	62°53.5'	+00.5'	84.4°	62°58.4'	+02.8'	86.3°	63°01.2'	+05.1'	88.3°	63°02.0'	+07.4'	90.2°	63°00.7'	+09.7'	92.2°	62°57.4'	+12.0'	94.2°	62°52.0'	+14.2'	96.1°	15
16	62°54.0'	-01.5'	82.2°	63°01.2'	+00.8'	84.1°	63°06.3'	+03.1'	86.1°	63°09.4'	+05.4'	88.0°	63°10.4'	+07.7'	90.0°	63°09.4'	+10.0'	92.0°	63°06.3'	+12.3'	94.0°	16
17	62°52.5'	-03.5'	80.0°	63°02.0'	-01.3'	81.9°	63°09.4'	+01.0'	83.9°	63°14.8'	+03.3'	85.8°	63°18.1'	+05.6'	87.8°	63°19.4'	+08.0'	89.8°	63°18.5'	+10.3'	91.8°	17
18	62°49.0'	-05.6'	77.8°	63°00.7'	-03.3'	79.7°	63°10.4'	-01.1'	81.6°	63°18.1'	+01.2'	83.6°	63°23.8'	+03.6'	85.6°	63°27.3'	+05.9'	87.6°	63°28.8'	+08.2'	89.6°	18
19	62°43.4'	-07.6'	75.6°	62°57.4'	-05.4'	77.5°	63°09.4'	-03.1'	79.4°	63°19.4'	-00.8'	81.4°	63°27.3'	+01.5'	83.4°	63°33.2'	+03.8'	85.4°	63°37.0'	+06.1'	87.4°	19
20	62°35.9'	-09.5'	73.4°	62°52.0'	-07.4'	75.3°	63°06.3'	-05.2'	77.2°	63°18.5'	-02.9'	79.2°	63°28.8'	-00.6'	81.1°	63°37.0'	+01.7'	83.1°	63°43.2'	+04.0'	85.1°	20
21	62°26.3'	-11.5'	71.3°	62°44.6'	-09.4'	73.1°	63°01.1'	-07.2'	75.0°	63°15.6'	-05.0'	76.9°	63°28.2'	-02.7'	78.9°	63°38.7'	-00.4'	80.9°	63°47.2'	+01.9'	82.9°	21
22	62°14.8'	-13.4'	69.2°	62°35.3'	-11.3'	71.0°	62°53.9'	-09.2'	72.8°	63°10.6'	-07.0'	74.7°	63°25.5'	-04.8'	76.7°	63°38.3'	-02.5'	78.6°	63°49.2'	-00.2'	80.6°	22
23	62°01.4'	-15.3'	67.1°	62°23.9'	-13.3'	68.9°	62°44.7'	-11.2'	70.7°	63°03.6'	-09.1'	72.5°	63°20.7'	-06.9'	74.4°	63°35.8'	-04.6'	76.4°	63°48.9'	-02.3'	78.3°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

28° 332° LHA

Latitude SAME as Declination

28° 332° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

29° 331° LHA

Latitude SAME as Declination

29° 331° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	58°03.8'	+26.8'	113.6°	57°39.1'	+28.4'	115.0°	57°13.1'	+29.9'	116.4°	56°45.7'	+31.4'	117.8°	56°17.1'	+32.9'	119.1°	55°47.3'	+34.2'	120.4°	55°16.4'	+35.5'	121.7°	0
1	58°30.6'	+25.4'	111.9°	58°07.5'	+27.1'	113.4°	57°43.0'	+28.7'	114.8°	57°17.2'	+30.2'	116.2°	56°50.0'	+31.7'	117.6°	56°21.5'	+33.1'	119.0°	55°51.9'	+34.5'	120.3°	1
2	58°56.0'	+23.9'	110.1°	58°34.6'	+25.7'	111.7°	58°11.7'	+27.4'	113.2°	57°47.4'	+29.0'	114.6°	57°21.7'	+30.5'	116.1°	56°54.7'	+32.0'	117.4°	56°26.4'	+33.4'	118.8°	2
3	59°19.9'	+22.4'	108.3°	59°00.3'	+24.2'	109.9°	58°39.0'	+26.0'	111.5°	58°16.3'	+27.6'	113.0°	57°52.2'	+29.3'	114.4°	57°26.7'	+30.8'	115.9°	56°59.9'	+32.3'	117.3°	3
4	59°42.4'	+20.9'	106.5°	59°24.5'	+22.7'	108.1°	59°05.0'	+24.5'	109.7°	58°44.0'	+26.3'	111.3°	58°21.5'	+28.0'	112.8°	57°57.5'	+29.6'	114.3°	57°32.2'	+31.1'	115.7°	4
5	60°03.2'	+19.3'	104.6°	59°47.2'	+21.2'	106.3°	59°29.5'	+23.0'	107.9°	59°10.3'	+24.8'	109.5°	58°49.4'	+26.6'	111.1°	58°27.1'	+28.3'	112.6°	58°03.3'	+29.9'	114.1°	5
6	60°22.5'	+17.6'	102.7°	60°08.4'	+19.6'	104.4°	59°52.6'	+21.5'	106.1°	59°35.1'	+23.3'	107.8°	59°16.0'	+25.1'	109.4°	58°55.4'	+26.9'	110.9°	58°33.2'	+28.6'	112.5°	6
7	60°40.1'	+15.9'	100.8°	60°28.0'	+17.9'	102.5°	60°14.1'	+19.9'	104.2°	59°58.4'	+21.8'	105.9°	59°41.2'	+23.7'	107.6°	59°22.2'	+25.5'	109.2°	59°01.7'	+27.2'	110.8°	7
8	60°56.0'	+14.1'	98.8°	60°45.8'	+16.2'	100.6°	60°33.9'	+18.2'	102.3°	60°20.2'	+20.2'	104.0°	60°04.8'	+22.1'	105.7°	59°47.7'	+24.0'	107.4°	59°29.0'	+25.8'	109.0°	8
9	61°10.1'	+12.3'	96.8°	61°02.0'	+14.4'	98.6°	60°52.1'	+16.5'	100.4°	60°40.4'	+18.5'	102.1°	60°26.9'	+20.5'	103.9°	60°11.7'	+22.4'	105.6°	59°54.7'	+24.3'	107.2°	9
10	61°22.4'	+10.5'	94.8°	61°16.4'	+12.6'	96.6°	61°08.6'	+14.7'	98.4°	60°58.9'	+16.8'	100.2°	60°47.4'	+18.8'	101.9°	60°34.1'	+20.8'	103.7°	60°19.0'	+22.7'	105.4°	10
11	61°32.8'	+08.6'	92.7°	61°29.0'	+10.7'	94.6°	61°23.3'	+12.9'	96.4°	61°15.7'	+15.0'	98.2°	61°06.2'	+17.1'	100.0°	60°54.9'	+19.1'	101.8°	60°41.8'	+21.1'	103.5°	11
12	61°41.4'	+06.7'	90.6°	61°39.8'	+08.8'	92.5°	61°36.2'	+11.0'	94.3°	61°30.7'	+13.2'	96.2°	61°23.3'	+15.3'	98.0°	61°14.0'	+17.4'	99.8°	61°02.9'	+19.4'	101.6°	12
13	61°48.0'	+04.7'	88.5°	61°48.6'	+06.9'	90.4°	61°47.2'	+09.1'	92.3°	61°43.9'	+11.3'	94.1°	61°38.6'	+13.5'	96.0°	61°31.4'	+15.6'	97.8°	61°22.3'	+17.7'	99.6°	13
14	61°52.8'	+02.8'	86.4°	61°55.5'	+05.0'	88.3°	61°56.3'	+07.2'	90.2°	61°55.2'	+09.4'	92.0°	61°52.1'	+11.6'	93.9°	61°47.0'	+13.8'	95.8°	61°40.0'	+15.9'	97.6°	14
15	61°55.5'	+00.8'	84.3°	62°00.5'	+03.0'	86.2°	62°03.5'	+05.2'	88.1°	62°04.6'	+07.5'	89.9°	62°03.7'	+09.7'	91.8°	62°00.8'	+11.9'	93.7°	61°55.9'	+14.1'	95.6°	15
16	61°56.3'	-01.2'	82.2°	62°03.5'	+01.1'	84.0°	62°08.8'	+03.3'	85.9°	62°12.1'	+05.5'	87.8°	62°13.4'	+07.7'	89.7°	62°12.7'	+10.0'	91.6°	62°10.0'	+12.2'	93.5°	16
17	61°55.2'	-03.1'	80.0°	62°04.6'	-00.9'	81.9°	62°12.1'	+01.3'	83.8°	62°17.6'	+03.5'	85.7°	62°21.1'	+05.8'	87.6°	62°22.6'	+08.0'	89.5°	62°22.2'	+10.3'	91.4°	17
18	61°52.1'	-05.1'	77.9°	62°03.7'	-02.9'	79.8°	62°13.4'	-00.7'	81.6°	62°21.1'	+01.5'	83.5°	62°26.9'	+03.8'	85.4°	62°30.7'	+06.0'	87.3°	62°32.4'	+08.3'	89.3°	18
19	61°47.0'	-07.0'	75.8°	62°00.8'	-04.9'	77.6°	62°12.7'	-02.7'	79.5°	62°22.6'	-00.5'	81.4°	62°30.7'	+01.8'	83.3°	62°36.7'	+04.0'	85.2°	62°40.7'	+06.3'	87.1°	19
20	61°40.0'	-08.9'	73.7°	61°55.9'	-06.8'	75.5°	62°10.0'	-04.7'	77.4°	62°22.2'	-02.5'	79.2°	62°32.4'	-00.2'	81.1°	62°40.7'	+02.0'	83.0°	62°47.0'	+04.3'	84.9°	20
21	61°31.1'	-10.8'	71.6°	61°49.1'	-08.7'	73.4°	62°05.3'	-06.6'														

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

30° 330° LHA

Latitude SAME as Declination

30° 330° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	57°10.3'	+26.1'	112.7°	56°46.4'	+27.7'	114.1°	56°21.2'	+29.2'	115.5°	55°54.8'	+30.7'	116.9°	55°27.0'	+32.2'	118.2°	54°58.1'	+33.5'	119.4°	54°28.1'	+34.8'	120.6°	0
1	57°36.4'	+24.8'	111.1°	57°14.2'	+26.4'	112.5°	56°50.5'	+28.0'	113.9°	56°25.5'	+29.5'	115.3°	55°59.2'	+31.0'	116.7°	55°31.7'	+32.5'	118.0°	55°02.9'	+33.8'	119.2°	1
2	58°01.2'	+23.4'	109.4°	57°40.6'	+25.1'	110.8°	57°18.5'	+26.7'	112.3°	56°55.0'	+28.3'	113.7°	56°30.2'	+29.9'	115.1°	56°04.1'	+31.3'	116.5°	55°36.8'	+32.8'	117.8°	2
3	58°24.5'	+21.9'	107.6°	58°05.6'	+23.7'	109.1°	57°45.2'	+25.4'	110.6°	57°23.4'	+27.0'	112.1°	57°00.1'	+28.6'	113.5°	56°35.5'	+30.2'	114.9°	56°09.5'	+31.6'	116.3°	3
4	58°46.4'	+20.4'	105.8°	58°29.3'	+22.2'	107.4°	58°10.6'	+24.0'	108.9°	57°50.4'	+25.7'	110.4°	57°28.7'	+27.3'	111.9°	57°05.6'	+28.9'	113.3°	56°41.2'	+30.5'	114.7°	4
5	59°06.8'	+18.8'	104.0°	58°51.5'	+20.7'	105.6°	58°34.6'	+22.5'	107.2°	58°16.1'	+24.3'	108.7°	57°56.0'	+26.0'	110.2°	57°34.6'	+27.7'	111.7°	57°11.6'	+29.3'	113.2°	5
6	59°25.6'	+17.2'	102.1°	59°12.2'	+19.1'	103.8°	58°57.1'	+21.0'	105.4°	58°40.3'	+22.8'	107.0°	58°22.0'	+24.6'	108.5°	58°02.2'	+26.3'	110.1°	57°40.9'	+28.0'	111.5°	6
7	59°42.8'	+15.5'	100.2°	59°31.3'	+17.5'	101.9°	59°18.1'	+19.4'	103.6°	59°03.2'	+21.3'	105.2°	58°46.6'	+23.1'	106.8°	58°28.5'	+24.9'	108.4°	58°08.9'	+26.6'	109.9°	7
8	59°58.4'	+13.8'	98.3°	59°48.8'	+15.9'	100.0°	59°37.5'	+17.8'	101.7°	59°24.5'	+19.8'	103.4°	59°09.8'	+21.6'	105.0°	58°53.5'	+23.5'	106.6°	58°35.5'	+25.2'	108.2°	8
9	60°12.2'	+12.1'	96.4°	60°04.7'	+14.1'	98.1°	59°55.3'	+16.2'	99.8°	59°44.2'	+18.1'	101.5°	59°31.4'	+20.1'	103.2°	59°16.9'	+22.0'	104.8°	59°00.8'	+23.8'	106.4°	9
10	60°24.3'	+10.3'	94.4°	60°18.8'	+12.4'	96.1°	60°11.5'	+14.5'	97.9°	60°02.4'	+16.5'	99.6°	59°51.5'	+18.5'	101.3°	59°38.9'	+20.4'	103.0°	59°24.6'	+22.3'	104.6°	10
11	60°34.7'	+08.5'	92.4°	60°31.2'	+10.6'	94.2°	60°26.0'	+12.7'	95.9°	60°18.9'	+14.8'	97.7°	60°10.0'	+16.8'	99.4°	59°59.3'	+18.8'	101.1°	59°46.8'	+20.7'	102.8°	11
12	60°43.2'	+06.7'	90.4°	60°41.9'	+08.8'	92.2°	60°38.7'	+10.9'	93.9°	60°33.6'	+13.0'	95.7°	60°26.7'	+15.1'	97.5°	60°18.1'	+17.1'	99.2°	60°07.6'	+19.1'	100.9°	12
13	60°49.8'	+04.8'	88.3°	60°50.7'	+07.0'	90.1°	60°49.6'	+09.1'	91.9°	60°46.6'	+11.2'	93.7°	60°41.8'	+13.3'	95.5°	60°35.2'	+15.4'	97.3°	60°26.7'	+17.4'	99.0°	13
14	60°54.7'	+02.9'	86.3°	60°57.6'	+05.1'	88.1°	60°58.7'	+07.2'	89.9°	60°57.8'	+09.4'	91.7°	60°55.1'	+11.5'	93.5°	60°50.5'	+13.6'	95.3°	60°44.1'	+15.7'	97.1°	14
15	60°57.6'	+01.1'	84.2°	61°02.7'	+03.2'	86.0°	61°05.9'	+05.4'	87.8°	61°07.2'	+07.5'	89.7°	61°06.6'	+09.7'	91.5°	61°04.2'	+11.8'	93.3°	60°59.8'	+13.9'	95.1°	15
16	60°58.7'	-00.8'	82.2°	61°05.9'	+01.3'	84.0°	61°11.3'	+03.5'	85.8°	61°14.7'	+05.6'	87.6°	61°16.3'	+07.8'	89.4°	61°16.0'	+10.0'	91.2°	61°13.7'	+12.1'	93.1°	16
17	60°57.8'	-02.7'	80.1°	61°07.2'	-00.6'	81.9°	61°14.7'	+01.6'	83.7°	61°20.4'	+03.7'	85.5°	61°24.1'	+05.9'	87.3°	61°25.9'	+08.1'	89.2°	61°25.8'	+10.3'	91.0°	17
18	60°55.1'	-04.6'	78.1°	61°06.6'	-02.5'	79.8°	61°16.3'	-00.3'	81.6°	61°24.1'	+01.8'	83.4°	61°30.0'	+04.0'	85.3°	61°34.0'	+06.2'	87.1°	61°36.1'	+08.4'	89.0°	18
19	60°50.5'	-06.4'	76.0°	61°04.2'	-04.4'	77.8°	61°16.0'	-02.3'	79.5°	61°25.9'	-00.1'	81.3°	61°34.0'	+02.1'	83.2°	61°40.2'	+04.2'	85.0°	61°44.4'	+06.4'	86.9°	19
20	60°44.1'	-08.3'	74.0°	60°59.8'	-06.2'	75.7°	61°13.7'	-04.2'	77.5°	61°25.8'	-02.0'	79.3°	61°36.1'	+00.1'	81.1°	61°44.4'	+02.3'	82.9°	61°50.9'	+04.5'	84.8°	20
21	60°35.8'	-10.1'	71.9°	60°53.5'	-08.1'	73.7°	61°09.6'	-06.0'	75.4°	61°23.8'	-03.9'	77.2°	61°36.2'	-01.8'	79.0°	61°46.7'	+00.4'	80.8°	61°55.4'	+02.5'	82.6°	21
22	60°25.7'	-11.9'	69.9°	60°45.4'	-09.9'	71.6°	61°03.5'	-07.9'	73.3°	61°19.8'	-05.8'	75.1°	61°34.4'	-03.7'	76.9°	61°47.1'	-01.6'	78.7°	61°57.9'	+00.6'	80.5°	22
23	60°13.8'	-13.6'	68.0°	60°35.5'	-11.7'	69.6°	60°55.6'	-09.8'	71.3°	61°14.0'	-07.7'	73.0°	61°30.6'	-05.7'	74.8°	61°45.5'	-03.5'	76.6°	61°58.5'	-01.4'	78.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

30° 330° LHA

Latitude SAME as Declination

30° 330° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

31° 329° LHA

Latitude SAME as Declination

31° 329° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	56°16.5'	+25.5'	111.9°	55°53.4'	+27.1'	113.3°	55°29.0'	+28.6'	114.6°	55°03.4'	+30.1'	115.9°	54°36.5'	+31.5'	117.2°	54°08.5'	+32.8'	118.5°	53°39.4'	+34.1'	119.6°	0
1	56°42.0'	+24.2'	110.3°	56°20.5'	+25.8'	111.7°	55°57.6'	+27.4'	113.1°	55°33.4'	+28.9'	114.4°	55°08.0'	+30.4'	115.7°	54°41.3'	+31.8'	117.0°	54°13.5'	+33.1'	118.3°	1
2	57°06.1'	+22.8'	108.6°	56°46.3'	+24.5'	110.1°	56°25.0'	+26.1'	111.5°	56°02.3'	+27.7'	112.9°	55°38.4'	+29.2'	114.2°	55°13.1'	+30.7'	115.5°	54°46.7'	+32.1'	116.8°	2
3	57°28.9'	+21.4'	106.9°	57°10.8'	+23.1'	108.4°	56°51.1'	+24.8'	109.8°	56°30.0'	+26.4'	111.3°	56°07.6'	+28.0'	112.7°	55°43.8'	+29.5'	114.0°	55°18.8'	+31.0'	115.3°	3
4	57°50.3'	+19.9'	105.2°	57°33.9'	+21.7'	106.7°	57°15.9'	+23.4'	108.2°	56°56.5'	+25.1'	109.6°	56°35.6'	+26.8'	111.1°	56°13.4'	+28.3'	112.5°	55°49.8'	+29.9'	113.8°	4
5	58°10.3'	+18.4'	103.4°	57°55.6'	+20.2'	104.9°	57°39.4'	+22.0'	106.5°	57°21.6'	+23.8'	108.0°	57°02.4'	+25.5'	109.4°	56°41.7'	+27.1'	110.9°	56°19.6'	+28.7'	112.3°	5
6	58°28.7'	+16.8'	101.6°	58°15.8'	+18.7'	103.2°	58°01.4'	+20.6'	104.7°	57°45.4'	+22.3'	106.2°	57°27.8'	+24.1'	107.8°	57°08.8'	+25.8'	109.2°	56°48.3'	+27.4'	110.7°	6
7	58°45.5'	+15.2'	99.7°	58°34.5'	+17.2'	101.3°	58°21.9'	+19.0'	102.9°	58°07.7'	+20.9'	104.5°	57°51.9'	+22.7'	106.0°	57°34.6'	+24.4'	107.6°	57°15.7'	+26.1'	109.0°	7
8	59°00.8'	+13.6'	97.8°	58°51.7'	+15.6'	99.5°	58°41.0'	+17.5'	101.1°	58°28.6'	+19.4'	102.7°	58°14.6'	+21.2'	104.3°	57°59.0'	+23.0'	105.8°	57°41.8'	+24.8'	107.4°	8
9	59°14.4'	+11.9'	96.0°	59°07.3'	+13.9'	97.6°	58°58.5'	+15.9'	99.3°	58°48.0'	+17.8'	100.9°	58°35.8'	+19.7'	102.5°	58°22.0'	+21.5'	104.1°	58°06.6'	+23.3'	105.7°	9
10	59°26.3'	+10.2'	94.0°	59°21.2'	+12.2'	95.7°	59°14.3'	+14.2'	97.4°	59°05.8'	+16.2'	99.0°	58°55.5'	+18.1'	100.7°	58°43.5'	+20.0'	102.3°	58°29.9'	+21.9'	103.9°	10
11	59°36.5'	+08.5'	92.1°	59°33.4'	+10.5'	93.8°	59°28.6'	+12.5'	95.5°	59°22.0'	+14.5'	97.2°	59°13.6'	+16.5'	98.8°	59°03.5'	+18.5'	100.5°	58°51.8'	+20.4'	102.1°	11
12	59°45.0'	+06.7'	90.1°	59°43.9'	+08.8'	91.8°	59°41.1'	+10.8'	93.5°	59°36.5'	+12.9'	95.3°	59°30.1'	+14.9'	96.9°	59°22.0'	+16.8'	98.6°	59°12.2'	+18.8'	100.3°	12
13	59°51.7'	+04.9'	88.1°	59°52.7'	+07.0'	89.9°	59°51.9'	+09.1'	91.6°	59°49.4'	+11.1'	93.3°	59°45.0'	+13.2'	95.0°	59°38.8'	+15.2'	96.7°	59°30.9'	+17.2'	98.4°	13
14	59°56.6'	+03.1'	86.2°	59°59.7'	+05.2'	87.9°	60°01.0'	+07.3'	89.6°	60°00.5'	+09.4'	91.4°	59°58.2'	+11.4'	93.1°	59°54.0'	+13.5'	94.8°	59°48.1'	+15.5'	96.5°	14
15	59°59.7'	+01.3'	84.2°	60°04.9'	+03.4'	85.9°	60°08.3'	+05.5'	87.6°	60°09.8'	+07.6'	89.4°	60°09.6'	+09.7'	91.1°	60°07.5'	+11.7'	92.9°	60°03.6'	+13.8'	94.6°	15
16	60°01.0'	-00.5'	82.2°	60°08.3'	+01.6'	83.9°	60°13.8'	+03.7'	85.6°	60°17.4'	+05.8'	87.4°	60°19.2'	+07.9'	89.1°	60°19.2'	+10.0'	90.9°	60°17.4'	+12.0'	92.6°	16
17	60°00.5'	-02.3'	80.2°	60°09.8'	-00.3'	81.9°	60°17.4'	+01.8'	83.6°	60°23.2'	+03.9'	85.4°	60°27.1'	+06.0'	87.1°	60°29.2'	+08.2'	88.9°	60°29.4'	+10.3'	90.7°	17
18	59°58.2'	-04.1'	78.2°	60°09.6'	-02.1'	79.9°	60°19.2'	00.0'	81.6°	60°27.1'	+02.1'	83.3°	60°33.2'	+04.2'	85.1°	60°37.4'	+06.3'	86.9°	60°39.7'	+08.4'	88.6°	18
19	59°54.0'	-05.9'	76.2°	60°07.5'	-03.9'	77.9°	60°19.2'	-01.8'	79.6°	60°29.2'	+00.2'	81.3°	60°37.4'	+02.3'	83.1°	60°43.7'	+04.5'	84.8°	60°48.1'	+06.6'	86.6°	19
20	59°48.1'	-07.7'	74.2°	60°03.6'	-05.7'	75.9°	60°17.4'	-03.7'	77.6°	60°29.4'	-01.6'	79.3°	60°39.7'	+00.5'	81.0°	60°48.1'	+02.6'	82.8°	60°54.7'	+04.7'	84.6°	20
21	59°40.4'	-09.5'	72.2°	59°57.9'	-07.5'	73.9°	60°13.7'	-05.5'	75.5°													

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

32° 328° LHA

Latitude SAME as Declination

32° 328° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	55°22.3'	+24.9'	111.2°	55°00.0'	+26.5'	112.5°	54°36.4'	+28.0'	113.8°	54°11.6'	+29.4'	115.1°	53°45.6'	+30.8'	116.3°	53°18.4'	+32.2'	117.5°	52°50.1'	+33.5'	118.7°	0
1	55°47.2'	+23.6'	109.6°	55°26.5'	+25.2'	110.9°	55°04.4'	+26.8'	112.3°	54°41.0'	+28.3'	113.6°	54°16.4'	+29.8'	114.9°	53°50.6'	+31.2'	116.1°	53°23.6'	+32.5'	117.3°	1
2	56°10.9'	+22.3'	107.9°	55°51.7'	+23.9'	109.3°	55°31.2'	+25.6'	110.7°	55°09.3'	+27.1'	112.0°	54°46.2'	+28.6'	113.4°	54°21.7'	+30.1'	114.6°	53°56.1'	+31.5'	115.9°	2
3	56°33.1'	+20.9'	106.2°	56°15.6'	+22.6'	107.7°	55°56.7'	+24.3'	109.1°	55°36.4'	+25.9'	110.5°	55°14.8'	+27.4'	111.8°	54°51.8'	+28.9'	113.1°	54°27.6'	+30.4'	114.4°	3
4	56°54.1'	+19.5'	104.5°	56°38.3'	+21.2'	106.0°	56°21.0'	+22.9'	107.4°	56°02.3'	+24.6'	108.9°	55°42.2'	+26.2'	110.3°	55°20.8'	+27.8'	111.6°	54°58.0'	+29.3'	112.9°	4
5	57°13.6'	+18.0'	102.8°	56°59.5'	+19.8'	104.3°	56°43.9'	+21.6'	105.8°	56°26.9'	+23.3'	107.2°	56°08.4'	+24.9'	108.7°	55°48.5'	+26.5'	110.0°	55°27.3'	+28.1'	111.4°	5
6	57°31.6'	+16.5'	101.0°	57°19.3'	+18.3'	102.6°	57°05.5'	+20.1'	104.1°	56°50.2'	+21.9'	105.5°	56°33.4'	+23.6'	107.0°	56°15.1'	+25.3'	108.4°	55°55.4'	+26.9'	109.8°	6
7	57°48.1'	+15.0'	99.2°	57°37.7'	+16.8'	100.8°	57°25.7'	+18.7'	102.3°	57°12.1'	+20.5'	103.8°	56°57.0'	+22.2'	105.3°	56°40.4'	+23.9'	106.8°	56°22.3'	+25.6'	108.2°	7
8	58°03.1'	+13.4'	97.4°	57°54.5'	+15.3'	99.0°	57°44.3'	+17.2'	100.5°	57°32.6'	+19.0'	102.1°	57°19.2'	+20.8'	103.6°	57°04.3'	+22.6'	105.1°	56°47.9'	+24.3'	106.6°	8
9	58°16.4'	+11.8'	95.5°	58°09.8'	+13.7'	97.2°	58°01.5'	+15.6'	98.7°	57°51.6'	+17.5'	100.3°	57°40.0'	+19.3'	101.9°	57°26.9'	+21.2'	103.4°	57°12.2'	+22.9'	104.9°	9
10	58°28.2'	+10.1'	93.7°	58°23.5'	+12.1'	95.3°	58°17.1'	+14.0'	96.9°	58°09.1'	+15.9'	98.5°	57°59.4'	+17.8'	100.1°	57°48.0'	+19.7'	101.7°	57°35.1'	+21.5'	103.2°	10
11	58°38.3'	+08.4'	91.8°	58°35.6'	+10.4'	93.4°	58°31.1'	+12.4'	95.1°	58°25.0'	+14.3'	96.7°	58°17.2'	+16.3'	98.3°	58°07.7'	+18.2'	99.9°	57°56.6'	+20.0'	101.5°	11
12	58°46.7'	+06.7'	89.9°	58°46.0'	+08.7'	91.5°	58°43.5'	+10.7'	93.2°	58°39.3'	+12.7'	94.8°	58°33.5'	+14.7'	96.4°	58°25.9'	+16.6'	98.1°	58°16.6'	+18.5'	99.7°	12
13	58°53.5'	+05.0'	88.0°	58°54.7'	+07.0'	89.6°	58°54.3'	+09.0'	91.3°	58°52.1'	+11.1'	92.9°	58°48.1'	+13.0'	94.6°	58°42.5'	+15.0'	96.2°	58°35.1'	+16.9'	97.9°	13
14	58°58.5'	+03.3'	86.0°	59°01.8'	+05.3'	87.7°	59°03.3'	+07.3'	89.4°	59°03.1'	+09.4'	91.0°	59°01.2'	+11.4'	92.7°	58°57.5'	+13.4'	94.4°	58°52.1'	+15.3'	96.0°	14
15	59°01.8'	+01.5'	84.1°	59°07.1'	+03.6'	85.8°	59°10.7'	+05.6'	87.4°	59°12.5'	+07.6'	89.1°	59°12.5'	+09.7'	90.8°	59°10.8'	+11.7'	92.5°	59°07.4'	+13.7'	94.1°	15
16	59°03.3'	-00.2'	82.1°	59°10.7'	+01.8'	83.8°	59°16.3'	+03.9'	85.5°	59°20.1'	+05.9'	87.2°	59°22.2'	+07.9'	88.8°	59°22.5'	+10.0'	90.5°	59°21.1'	+12.0'	92.2°	16
17	59°03.1'	-01.9'	80.2°	59°12.5'	+00.1'	81.9°	59°20.1'	+02.1'	83.5°	59°26.0'	+04.1'	85.2°	59°30.1'	+06.2'	86.9°	59°32.5'	+08.2'	88.6°	59°33.1'	+10.3'	90.3°	17
18	59°01.2'	-03.7'	78.3°	59°12.5'	-01.7'	79.9°	59°22.2'	+00.3'	81.6°	59°30.1'	+02.4'	83.2°	59°36.3'	+04.4'	84.9°	59°40.7'	+06.5'	86.6°	59°43.3'	+08.5'	88.3°	18
19	58°57.5'	-05.4'	76.3°	59°10.8'	-03.4'	78.0°	59°22.5'	-01.4'	79.6°	59°32.5'	+00.6'	81.3°	59°40.7'	+02.6'	83.0°	59°47.2'	+04.7'	84.7°	59°51.9'	+06.8'	86.4°	19
20	58°52.1'	-07.1'	74.4°	59°07.4'	-05.2'	76.0°	59°21.1'	-03.2'	77.6°	59°33.1'	-01.2'	79.3°	59°43.3'	+00.8'	81.0°	59°51.9'	+02.9'	82.7°	59°58.6'	+05.0'	84.4°	20
21	58°44.9'	-08.8'	72.5°	59°02.2'	-06.9'	74.1°	59°17.9'	-05.0'	75.7°	59°31.9'	-03.0'	77.3°	59°44.2'	-01.0'	79.0°	59°54.7'	+01.1'	80.7°	60°03.6'	+03.1'	82.4°	21
22	58°36.1'	-10.5'	70.6°	58°55.3'	-08.6'	72.1°	59°12.9'	-06.7'	73.7°	59°28.9'	-04.7'	75.4°	59°43.2'	-02.8'	77.0°	59°55.8'	-00.7'	78.7°	60°06.7'	+01.3'	80.4°	22
23	58°25.6'	-12.1'	68.7°	58°46.7'	-10.3'	70.2°	59°06.2'	-08.4'	71.8°	59°24.1'	-06.5'	73.4°	59°40.5'	-04.5'	75.0°	59°55.1'	-02.5'	76.7°	60°08.0'	-00.5'	78.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

32° 328° LHA

Latitude SAME as Declination

32° 328° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

33° 327° LHA

Latitude SAME as Declination

33° 327° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	54°27.9'	+24.4'	110.4°	54°06.3'	+25.9'	111.7°	53°43.5'	+27.4'	113.0°	53°19.4'	+28.8'	114.2°	52°54.2'	+30.2'	115.4°	52°27.9'	+31.6'	116.6°	52°00.5'	+32.9'	117.8°	0
1	54°52.2'	+23.1'	108.9°	54°32.2'	+24.7'	110.2°	54°10.9'	+26.2'	111.5°	53°48.3'	+27.7'	112.8°	53°24.4'	+29.2'	114.0°	52°59.5'	+30.6'	115.2°	52°33.3'	+31.9'	116.4°	1
2	55°15.4'	+21.8'	107.2°	54°56.9'	+23.4'	108.6°	54°37.1'	+25.0'	109.9°	54°16.0'	+26.6'	111.3°	53°53.6'	+28.0'	112.5°	53°30.0'	+29.5'	113.8°	53°05.2'	+30.9'	115.0°	2
3	55°37.2'	+20.5'	105.6°	55°20.3'	+22.1'	107.0°	55°02.1'	+23.8'	108.4°	54°42.5'	+25.4'	109.7°	54°21.7'	+26.9'	111.0°	53°59.5'	+28.4'	112.3°	53°36.1'	+29.8'	113.6°	3
4	55°57.6'	+19.1'	103.9°	55°42.5'	+20.8'	105.4°	55°25.9'	+22.5'	106.8°	55°07.9'	+24.1'	108.1°	54°48.5'	+25.7'	109.5°	54°27.9'	+27.2'	110.8°	54°05.9'	+28.7'	112.1°	4
5	56°16.7'	+17.7'	102.2°	56°03.3'	+19.4'	103.7°	55°48.3'	+21.1'	105.1°	55°32.0'	+22.8'	106.5°	55°14.2'	+24.4'	107.9°	54°55.1'	+26.0'	109.3°	54°34.7'	+27.6'	110.6°	5
6	56°34.4'	+16.2'	100.5°	56°22.7'	+18.0'	102.0°	56°09.5'	+19.8'	103.4°	55°54.8'	+21.5'	104.9°	55°38.7'	+23.2'	106.3°	55°21.2'	+24.8'	107.7°	55°02.2'	+26.4'	109.1°	6
7	56°50.6'	+14.7'	98.7°	56°40.7'	+16.5'	100.2°	56°29.2'	+18.3'	101.7°	56°16.3'	+20.1'	103.2°	56°01.8'	+21.8'	104.7°	55°45.9'	+23.5'	106.1°	55°28.6'	+25.1'	107.5°	7
8	57°05.3'	+13.2'	97.0°	56°57.2'	+15.0'	98.5°	56°47.6'	+16.9'	100.0°	56°36.4'	+18.7'	101.5°	56°23.7'	+20.4'	103.0°	56°09.5'	+22.2'	104.4°	55°53.8'	+23.9'	105.9°	8
9	57°18.5'	+11.6'	95.2°	57°12.3'	+13.5'	96.7°	57°04.5'	+15.4'	98.2°	56°55.1'	+17.2'	99.8°	56°44.1'	+19.0'	101.3°	56°31.6'	+20.8'	102.8°	56°17.6'	+22.5'	104.2°	9
10	57°30.1'	+10.0'	93.3°	57°25.8'	+11.9'	94.9°	57°19.8'	+13.8'	96.5°	57°12.3'	+15.7'	98.0°	57°03.1'	+17.6'	99.5°	56°52.4'	+19.4'	101.0°	56°40.1'	+21.1'	102.5°	10
11	57°40.1'	+08.4'	91.5°	57°37.7'	+10.3'	93.1°	57°33.7'	+12.3'	94.7°	57°28.0'	+14.2'	96.2°	57°20.7'	+16.0'	97.8°	57°11.8'	+17.9'	99.3°	57°01.3'	+19.7'	100.8°	11
12	57°48.5'	+06.8'	89.6°	57°48.1'	+08.7'	91.2°	57°45.9'	+10.7'	92.8°	57°42.2'	+12.6'	94.4°	57°36.7'	+14.5'	96.0°	57°29.7'	+16.4'	97.5°	57°21.0'	+18.2'	99.1°	12
13	57°55.3'	+05.1'	87.8°	57°56.8'	+07.1'	89.4°	57°56.6'	+09.0'	91.0°	57°54.8'	+11.0'	92.6°	57°51.2'	+12.9'	94.2°	57°46.1'	+14.8'	95.7°	57°39.2'	+16.7'	97.3°	13
14	58°00.4'	+03.5'	85.9°	58°03.9'	+05.4'	87.5°	58°05.6'	+07.4'	89.1°	58°05.7'	+09.4'	90.7°	58°04.2'	+11.3'	92.3°	58°00.9'	+13.3'	93.9°	57°56.0'	+15.2'	95.5°	14
15	58°03.9'	+01.8'	84.0°	58°09.3'	+03.7'	85.6°	58°13.0'	+05.7'	87.2°	58°15.1'	+07.7'	88.8°	58°15.5'	+09.7'	90.5°	58°14.1'	+11.6'	92.1°	58°11.1'	+13.6'	93.7°	15
16	58°05.6'	+00.1'	82.1°	58°13.0'	+02.1'	83.7°	58°18.8'	+04.0'	85.3°	58°22.8'	+06.0'	87.0°	58°25.1'	+08.0'	88.6°	58°25.8'	+10.0'	90.2°	58°24.7'	+12.0'	91.8°	16
17	58°05.7'	-01.6'	80.2°	58°15.1'	+00.4'	81.8°	58°22.8'	+02.3'	83.4°	58°28.8'	+04.3'	85.1°	58°33.2'	+06.3'	86.7°	58°35.8'	+08.3'	88.3°	58°36.7'	+10.3'	90.0°	17
18	58°04.2'	-03.3'	78.3°	58°15.5'	-01.3'	79.9°	58°25.1'	+00.6'	81.5°	58°33.2'	+02.6'	83.1°	58°39.5'	+04.6'	84.8°	58°44.1'	+06.6'	86.4°	58°47.0'	+08.6'	88.1°	18
19	58°00.9'	-04.9'	76.5°	58°14.1'	-03.0'	78.0°	58°25.8'	-01.1'	79.6°	58°35.8'	+00.9'	81.2°	58°44.1'	+02.9'	82.9°	58°50.7'	+04.9'	84.5°	58°55.6'	+06.9'	86.1°	19
20	57°56.0'	-06.6'	74.6°	58°11.1'	-04.7'	76.1°	58°24.7'	-02.8'	77.7°	58°36.7'	-00.8'	79.3°	58°47.0'	+01.2'	80.9°	58°55.6'	+03.2'	82.6°	59°02.5'	+05.2'	84.2°	20
21	57°49.4'	-08.2'	72.7°	58°06.4'	-06.4'	74.2°	58°															

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

34° 326° LHA

Latitude SAME as Declination

34° 326° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	53°33.2'	+23.8'	109.7°	53°12.3'	+25.4'	111.0°	52°50.2'	+26.8'	112.2°	52°26.9'	+28.3'	113.4°	52°02.5'	+29.6'	114.6°	51°37.0'	+31.0'	115.8°	51°10.4'	+32.3'	116.9°	0
1	53°57.0'	+22.6'	108.2°	53°37.7'	+24.2'	109.5°	53°17.1'	+25.7'	110.7°	52°55.2'	+27.2'	112.0°	52°32.2'	+28.6'	113.2°	52°08.0'	+30.0'	114.4°	51°42.6'	+31.3'	115.5°	1
2	54°19.7'	+21.3'	106.6°	54°01.9'	+23.0'	107.9°	53°42.7'	+24.5'	109.2°	53°22.4'	+26.0'	110.5°	53°00.7'	+27.5'	111.7°	52°37.9'	+28.9'	113.0°	52°13.9'	+30.3'	114.2°	2
3	54°41.0'	+20.0'	105.0°	54°24.8'	+21.7'	106.3°	54°07.3'	+23.3'	107.7°	53°48.4'	+24.9'	109.0°	53°28.2'	+26.4'	110.3°	53°06.9'	+27.9'	111.5°	52°44.3'	+29.3'	112.7°	3
4	55°01.1'	+18.7'	103.4°	54°46.5'	+20.4'	104.7°	54°30.5'	+22.0'	106.1°	54°13.2'	+23.6'	107.4°	53°54.6'	+25.2'	108.7°	53°34.7'	+26.7'	110.0°	53°13.5'	+28.2'	111.3°	4
5	55°19.8'	+17.3'	101.7°	55°06.9'	+19.1'	103.1°	54°52.6'	+20.7'	104.5°	54°36.9'	+22.4'	105.8°	54°19.8'	+24.0'	107.2°	54°01.4'	+25.6'	108.5°	53°41.7'	+27.1'	109.8°	5
6	55°37.1'	+15.9'	100.0°	55°25.9'	+17.7'	101.4°	55°13.3'	+19.4'	102.8°	54°59.3'	+21.1'	104.2°	54°43.8'	+22.7'	105.6°	54°27.0'	+24.3'	107.0°	54°08.8'	+25.9'	108.3°	6
7	55°53.0'	+14.5'	98.3°	55°43.6'	+16.3'	99.7°	55°32.7'	+18.0'	101.2°	55°20.4'	+19.7'	102.6°	55°06.6'	+21.4'	104.0°	54°51.3'	+23.1'	105.4°	54°34.7'	+24.7'	106.7°	7
8	56°07.5'	+13.0'	96.5°	55°59.9'	+14.8'	98.0°	55°50.7'	+16.6'	99.5°	55°40.1'	+18.4'	100.9°	55°28.0'	+21.0'	102.4°	55°14.4'	+21.8'	103.8°	54°59.4'	+23.4'	105.2°	8
9	56°20.5'	+11.5'	94.8°	56°14.7'	+13.3'	96.3°	56°07.3'	+15.2'	97.8°	55°58.5'	+17.0'	99.2°	55°48.1'	+18.7'	100.7°	55°36.2'	+20.5'	102.1°	55°22.9'	+22.2'	103.5°	9
10	56°32.0'	+10.0'	93.0°	56°28.0'	+11.8'	94.5°	56°22.5'	+13.7'	96.0°	56°15.4'	+15.5'	97.5°	56°06.8'	+17.3'	99.0°	55°56.7'	+19.1'	100.5°	55°45.0'	+20.8'	101.9°	10
11	56°41.9'	+08.4'	91.2°	56°39.8'	+10.3'	92.7°	56°36.2'	+12.2'	94.3°	56°30.9'	+14.0'	95.8°	56°24.1'	+15.8'	97.3°	56°15.7'	+17.7'	98.8°	56°05.8'	+19.4'	100.2°	11
12	56°50.3'	+06.8'	89.4°	56°50.1'	+08.7'	90.9°	56°48.3'	+10.6'	92.5°	56°44.9'	+12.5'	94.0°	56°40.0'	+14.4'	95.5°	56°33.4'	+16.2'	97.0°	56°25.3'	+18.0'	98.5°	12
13	56°57.1'	+05.2'	87.6°	56°58.8'	+07.1'	89.1°	56°58.9'	+09.0'	90.7°	56°57.4'	+10.9'	92.2°	56°54.3'	+12.8'	93.7°	56°49.6'	+14.7'	95.3°	56°43.3'	+16.5'	96.8°	13
14	57°02.4'	+03.6'	85.8°	57°06.0'	+05.5'	87.3°	57°08.0'	+07.5'	88.9°	57°08.4'	+09.4'	90.4°	57°07.1'	+11.3'	92.0°	57°04.3'	+13.2'	93.5°	56°59.8'	+15.0'	95.0°	14
15	57°06.0'	+02.0'	83.9°	57°11.5'	+03.9'	85.5°	57°15.4'	+05.8'	87.0°	57°17.7'	+07.8'	88.6°	57°18.4'	+09.7'	90.1°	57°17.4'	+11.6'	91.7°	57°14.9'	+13.5'	93.3°	15
16	57°08.0'	+00.4'	82.1°	57°15.4'	+02.3'	83.6°	57°21.3'	+04.2'	85.2°	57°25.5'	+06.2'	86.7°	57°28.1'	+08.1'	88.3°	57°29.1'	+10.0'	89.9°	57°28.4'	+11.9'	91.4°	16
17	57°08.4'	-01.2'	80.3°	57°17.7'	+00.7'	81.8°	57°25.5'	+02.6'	83.3°	57°31.7'	+04.5'	84.9°	57°36.2'	+06.5'	86.5°	57°39.1'	+08.4'	88.0°	57°40.3'	+10.3'	89.6°	17
18	57°07.1'	-02.9'	78.4°	57°18.4'	-01.0'	79.9°	57°28.1'	+01.0'	81.5°	57°36.2'	+02.9'	83.0°	57°42.7'	+04.8'	84.6°	57°47.5'	+06.8'	86.2°	57°50.6'	+08.7'	87.8°	18
19	57°04.3'	-04.5'	76.6°	57°17.4'	-02.6'	78.1°	57°29.1'	-00.7'	79.6°	57°39.1'	+01.2'	81.2°	57°47.5'	+03.2'	82.7°	57°54.2'	+05.1'	84.3°	57°59.4'	+07.1'	85.9°	19
20	56°59.8'	-06.1'	74.7°	57°14.9'	-04.2'	76.2°	57°28.4'	-02.3'	77.8°	57°40.3'	-00.4'	79.3°	57°50.6'	+01.5'	80.9°	57°59.4'	+03.4'	82.4°	58°06.4'	+05.4'	84.0°	20
21	56°53.8'	-07.6'	72.9°	57°10.6'	-05.8'	74.4°	57°26.0'	-04.0'	75.9°	57°39.9'	-02.1'	77.4°	57°52.0'	-00.2'	79.0°	58°02.8'	+01.8'	80.6°	58°11.8'	+03.7'	82.1°	21
22	56°46.1'	-09.2'	71.1°	57°04.8'	-07.4'	72.6°	57°22.1'	-05.6'	74.0°	57°37.8'	-03.7'	75.6°	57°52.0'	-01.8'	77.1°	58°04.6'	+00.1'	78.7°	58°15.6'	+02.0'	80.2°	22
23	56°36.9'	-10.8'	69.3°	56°57.4'	-09.0'	70.7°	57°16.5'	-07.2'	72.2°	57°34.1'	-05.4'	73.7°	57°50.1'	-03.5'	75.2°	58°04.7'	-01.6'	76.8°	58°17.6'	+00.3'	78.3°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

34° 326° LHA

Latitude SAME as Declination

34° 326° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

35° 325° LHA

Latitude SAME as Declination

35° 325° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	52°38.3'	+23.3'	109.1°	52°18.1'	+24.8'	110.3°	51°56.7'	+26.3'	111.5°	51°34.1'	+27.7'	112.7°	51°10.5'	+29.1'	113.8°	50°45.7'	+30.4'	114.9°	50°19.9'	+31.7'	116.0°	0
1	53°01.6'	+22.1'	107.5°	52°42.9'	+23.7'	108.8°	52°23.0'	+25.2'	110.0°	52°01.9'	+26.6'	111.2°	51°39.5'	+28.1'	112.4°	51°16.1'	+29.4'	113.6°	50°51.6'	+30.8'	114.7°	1
2	53°23.8'	+20.9'	106.0°	53°06.6'	+22.5'	107.3°	52°48.2'	+24.0'	108.5°	52°28.5'	+25.5'	109.8°	52°07.6'	+27.0'	111.0°	51°45.5'	+28.4'	112.2°	51°22.3'	+29.8'	113.3°	2
3	53°44.7'	+19.7'	104.4°	53°29.1'	+21.3'	105.7°	53°12.2'	+22.8'	107.0°	52°54.0'	+24.4'	108.3°	52°34.6'	+25.9'	109.5°	52°13.9'	+27.3'	110.7°	51°52.1'	+28.8'	111.9°	3
4	54°04.3'	+18.4'	102.8°	53°50.4'	+20.0'	104.1°	53°35.0'	+21.6'	105.5°	53°18.4'	+23.2'	106.7°	53°00.5'	+24.7'	108.0°	52°41.3'	+26.2'	109.3°	52°20.9'	+27.7'	110.5°	4
5	54°22.7'	+17.0'	101.2°	54°10.4'	+18.7'	102.5°	53°56.7'	+20.4'	103.9°	53°41.6'	+22.0'	105.2°	53°25.2'	+23.6'	106.5°	53°07.5'	+25.1'	107.8°	52°48.6'	+26.6'	109.0°	5
6	54°39.7'	+15.7'	99.5°	54°29.1'	+17.4'	100.9°	54°17.0'	+19.1'	102.3°	54°03.6'	+20.7'	103.6°	53°48.8'	+22.3'	105.0°	53°32.6'	+23.9'	106.3°	53°15.2'	+25.5'	107.6°	6
7	54°55.4'	+14.3'	97.8°	54°46.4'	+16.0'	99.2°	54°36.1'	+17.7'	100.6°	54°24.3'	+19.4'	102.0°	54°11.1'	+21.1'	103.4°	53°56.6'	+22.7'	104.7°	53°40.6'	+24.3'	106.0°	7
8	55°09.6'	+12.8'	96.2°	55°02.4'	+14.6'	97.6°	54°53.8'	+16.4'	99.0°	54°43.7'	+18.1'	100.4°	54°32.2'	+19.8'	101.8°	54°19.3'	+21.4'	103.1°	54°04.9'	+23.1'	104.5°	8
9	55°22.4'	+11.4'	94.4°	55°17.1'	+13.2'	95.9°	55°10.2'	+15.0'	97.3°	55°01.8'	+16.7'	98.7°	54°52.0'	+18.4'	100.1°	54°40.7'	+20.1'	101.5°	54°28.0'	+21.8'	102.9°	9
10	55°33.8'	+09.9'	92.7°	55°30.2'	+11.7'	94.2°	55°25.1'	+13.5'	95.6°	55°18.5'	+15.3'	97.0°	55°10.4'	+17.1'	98.5°	55°00.8'	+18.8'	99.9°	54°49.8'	+20.5'	101.3°	10
11	55°43.7'	+08.4'	91.0°	55°41.9'	+10.2'	92.4°	55°38.6'	+12.1'	93.9°	55°33.8'	+13.9'	95.3°	55°27.5'	+15.7'	96.8°	55°19.6'	+17.4'	98.2°	55°10.3'	+19.2'	99.6°	11
12	55°52.1'	+06.9'	89.2°	55°52.2'	+08.7'	90.7°	55°50.7'	+10.6'	92.1°	55°47.7'	+12.4'	93.6°	55°43.1'	+14.2'	95.1°	55°37.1'	+16.0'	96.5°	55°29.5'	+17.8'	98.0°	12
13	55°59.0'	+05.3'	87.4°	56°00.9'	+07.2'	88.9°	56°01.3'	+09.1'	90.4°	56°00.1'	+10.9'	91.9°	55°57.4'	+12.7'	93.3°	55°53.1'	+14.6'	94.8°	55°47.3'	+16.4'	96.3°	13
14	56°04.3'	+03.8'	85.6°	56°08.1'	+05.7'	87.1°	56°10.3'	+07.5'	88.6°	56°11.0'	+09.4'	90.1°	56°10.1'	+11.2'	91.6°	56°07.6'	+13.1'	93.1°	56°03.6'	+14.9'	94.6°	14
15	56°08.1'	+02.2'	83.8°	56°13.7'	+04.1'	85.3°	56°17.8'	+06.0'	86.8°	56°20.4'	+07.9'	88.3°	56°21.3'	+09.7'	89.8°	56°20.7'	+11.6'	91.3°	56°18.6'	+13.4'	92.8°	15
16	56°10.3'	+00.7'	82.1°	56°17.8'	+02.5'	83.5°	56°23.8'	+04.4'	85.0°	56°28.2'	+06.3'	86.5°	56°31.1'	+08.2'	88.0°	56°32.3'	+10.1'	89.6°	56°32.0'	+11.9'	91.1°	16
17	56°11.0'	-00.9'	80.3°	56°20.4'	+01.0'	81.7°	56°28.2'	+02.8'	83.2°	56°34.5'	+04.7'	84.7°	56°39.2'	+06.6'	86.2°	56°42.4'	+08.5'	87.8°	56°43.9'	+10.4'	89.3°	17
18	56°10.1'	-02.5'	78.5°	56°21.3'	-00.6'	79.9°	56°31.1'	+01.3'	81.4°	56°39.2'	+03.1'	82.9°	56°45.8'	+05.0'	84.4°	56°50.9'	+06.9'	86.0°	56°54.3'	+08.8'	87.5°	18
19	56°07.6'	-04.0'	76.7°	56°20.7'	-02.2'	78.1°	56°32.3'	-00.3'	79.6°	56°42.4'	+01.5'	81.1°	56°54.3'	+03.4'	82.6°	56°57.8'	+05.3'	84.1°	57°03.1'	+07.2'	85.7°	19
20	56°03.6'	-05.6'	74.9°	56°18.6'	-03.7'	76.3°	56°32.0'	-01.9'	77.8°	56°43.9'	-00.1'	79.3°	56°54.3'	+01.8'	80.8°	57°03.1'	+03.7'	82.3°	57°10.4'	+05.6'	83.8°	20
21	55°58.1'	-07.1'	73.1°	56°14.8'	-05.3'	74.5°	56°30.1'	-03.5'	76.0°	56°43.9'	-01.6'	77.5°										

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

36° 324° LHA

Latitude SAME as Declination

36° 324° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	51°43.2'	+22.9'	108.4°	51°23.6'	+24.3'	109.6°	51°02.9'	+25.8'	110.8°	50°41.1'	+27.2'	111.9°	50°18.1'	+28.5'	113.0°	49°54.1'	+29.9'	114.1°	49°29.1'	+31.1'	115.2°	0
1	52°06.0'	+21.7'	106.9°	51°48.0'	+23.2'	108.1°	51°28.7'	+24.7'	109.3°	51°08.2'	+26.1'	110.5°	50°46.7'	+27.5'	111.7°	50°24.0'	+28.9'	112.8°	50°00.2'	+30.2'	113.9°	1
2	52°27.7'	+20.5'	105.4°	52°11.2'	+22.1'	106.6°	51°53.4'	+23.6'	107.9°	51°34.4'	+25.1'	109.1°	51°14.2'	+26.5'	110.2°	50°52.9'	+27.9'	111.4°	50°30.4'	+29.3'	112.5°	2
3	52°48.2'	+19.3'	103.8°	52°33.2'	+20.9'	105.1°	52°17.0'	+22.4'	106.4°	51°59.4'	+23.9'	107.6°	51°40.7'	+25.4'	108.8°	51°20.8'	+26.9'	110.0°	50°59.7'	+28.3'	111.2°	3
4	53°07.5'	+18.0'	102.3°	52°54.1'	+19.6'	103.6°	52°39.4'	+21.2'	104.8°	52°23.4'	+22.8'	106.1°	52°06.1'	+24.3'	107.3°	51°47.6'	+25.8'	108.6°	51°27.9'	+27.2'	109.7°	4
5	53°25.5'	+16.7'	100.7°	53°13.7'	+18.4'	102.0°	53°00.6'	+20.0'	103.3°	52°46.2'	+21.6'	104.6°	52°30.4'	+23.2'	105.8°	52°13.4'	+24.7'	107.1°	51°55.2'	+26.2'	108.3°	5
6	53°42.3'	+15.4'	99.1°	53°32.1'	+17.1'	100.4°	53°20.6'	+18.7'	101.7°	53°07.7'	+20.4'	103.0°	52°53.6'	+22.0'	104.3°	52°38.1'	+23.5'	105.6°	52°21.3'	+25.0'	106.8°	6
7	53°57.7'	+14.1'	97.4°	53°49.2'	+15.8'	98.8°	53°39.4'	+17.5'	100.1°	53°28.1'	+19.1'	101.5°	53°15.5'	+20.7'	102.8°	53°01.6'	+22.3'	104.1°	52°46.4'	+23.9'	105.3°	7
8	54°11.7'	+12.7'	95.8°	54°05.0'	+14.4'	97.1°	53°56.8'	+16.1'	98.5°	53°47.2'	+17.8'	99.9°	53°36.3'	+19.5'	101.2°	53°23.9'	+21.1'	102.5°	53°10.3'	+22.7'	103.8°	8
9	54°24.4'	+11.3'	94.1°	54°19.4'	+13.0'	95.5°	54°12.9'	+14.8'	96.9°	54°05.0'	+16.5'	98.2°	53°55.7'	+18.2'	99.6°	53°45.0'	+19.8'	100.9°	53°33.0'	+21.5'	102.3°	9
10	54°35.7'	+9.8'	92.4°	54°32.4'	+11.6'	93.8°	54°27.7'	+13.4'	95.2°	54°21.5'	+15.1'	96.6°	54°13.9'	+16.9'	98.0°	54°04.9'	+18.6'	99.3°	53°54.5'	+20.2'	100.7°	10
11	54°45.5'	+8.4'	90.7°	54°44.0'	+10.2'	92.1°	54°41.1'	+12.0'	93.5°	54°36.7'	+13.7'	94.9°	54°30.8'	+15.5'	96.3°	54°23.5'	+17.2'	97.7°	54°14.7'	+18.9'	99.1°	11
12	54°53.9'	+6.9'	89.0°	54°54.2'	+8.7'	90.4°	54°53.1'	+10.5'	91.8°	54°50.4'	+12.3'	93.2°	54°46.3'	+14.1'	94.7°	54°40.7'	+15.9'	96.1°	54°33.6'	+17.6'	97.5°	12
13	55°00.8'	+5.4'	87.2°	55°02.9'	+7.3'	88.7°	55°03.6'	+9.1'	90.1°	55°02.7'	+10.9'	91.5°	55°00.4'	+12.7'	93.0°	54°56.5'	+14.5'	94.4°	54°51.2'	+16.2'	95.8°	13
14	55°06.3'	+4.0'	85.5°	55°10.2'	+5.8'	86.9°	55°12.7'	+7.6'	88.4°	55°13.6'	+9.4'	89.8°	55°13.1'	+11.2'	91.3°	55°11.0'	+13.0'	92.7°	55°07.4'	+14.8'	94.1°	14
15	55°10.2'	+2.5'	83.8°	55°16.0'	+4.3'	85.2°	55°20.3'	+6.1'	86.6°	55°23.0'	+7.9'	88.1°	55°24.3'	+9.8'	89.5°	55°24.0'	+11.6'	91.0°	55°22.2'	+13.4'	92.4°	15
16	55°12.7'	+0.9'	82.0°	55°20.3'	+2.8'	83.4°	55°26.4'	+4.6'	84.9°	55°31.0'	+6.4'	86.3°	55°34.0'	+8.3'	87.8°	55°35.6'	+10.1'	89.2°	55°35.6'	+11.9'	90.7°	16
17	55°13.6'	-0.6'	80.3°	55°23.0'	+0.1'	81.7°	55°31.0'	+0.3'	83.1°	55°37.4'	+4.9'	84.6°	55°42.3'	+6.8'	86.0°	55°45.7'	+8.6'	87.5°	55°47.5'	+10.4'	89.0°	17
18	55°13.1'	-0.2'	78.5°	55°24.3'	-0.3'	79.9°	55°34.0'	+0.1'	81.4°	55°42.3'	+3.4'	82.8°	55°49.1'	+5.2'	84.3°	55°54.3'	+7.1'	85.7°	55°58.0'	+8.9'	87.2°	18
19	55°11.0'	-0.3'	76.8°	55°24.0'	-0.1'	78.2°	55°35.6'	+0.0'	79.6°	55°45.7'	+1.9'	81.0°	55°54.3'	+3.7'	82.5°	56°01.4'	+5.5'	84.0°	56°06.9'	+7.4'	85.4°	19
20	55°07.4'	-0.5'	75.0°	55°22.2'	-0.3'	76.4°	55°35.6'	-0.1'	77.8°	55°47.5'	+0.3'	79.3°	55°58.0'	+2.1'	80.7°	56°06.9'	+4.0'	82.2°	56°14.3'	+5.9'	83.7°	20
21	55°02.4'	-0.6'	73.3°	55°18.9'	-0.4'	74.6°	55°34.1'	-0.3'	76.1°	55°47.9'	-0.1'	77.5°	56°00.1'	+0.6'	78.9°	56°10.9'	+2.4'	80.4°	56°20.2'	+4.3'	81.9°	21
22	54°55.8'	-0.8'	71.5°	55°14.1'	-0.6'	72.9°	55°31.1'	-0.4'	74.3°	55°46.6'	-0.2'	75.7°	56°00.7'	-0.1'	77.1°	56°13.3'	+0.9'	78.6°	56°24.4'	+2.7'	80.1°	22
23	54°47.8'	-0.9'	69.8°	55°07.8'	-0.7'	71.2°	55°26.5'	-0.6'	72.5°	55°43.9'	-0.4'	73.9°	55°59.8'	-0.2'	75.3°	56°14.2'	-0.0'	76.8°	56°27.2'	+0.1'	78.3°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

36° 324° LHA

Latitude SAME as Declination

36° 324° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

37° 323° LHA

Latitude SAME as Declination

37° 323° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	50°47.8'	+22.4'	107.8°	50°28.9'	+23.9'	109.0°	50°08.9'	+25.3'	110.1°	49°47.7'	+26.7'	111.2°	49°25.5'	+28.0'	112.3°	49°02.2'	+29.3'	113.4°	48°37.9'	+30.6'	114.4°	0
1	51°10.2'	+21.3'	106.3°	50°52.8'	+22.8'	107.5°	50°34.1'	+24.2'	108.7°	50°14.4'	+25.7'	109.8°	49°53.5'	+27.0'	110.9°	49°31.5'	+28.4'	112.0°	49°08.5'	+29.7'	113.1°	1
2	51°31.5'	+20.1'	104.8°	51°15.6'	+21.6'	106.0°	50°58.4'	+23.1'	107.2°	50°40.0'	+24.6'	108.4°	50°20.5'	+26.0'	109.5°	50°00.0'	+27.4'	110.7°	49°38.2'	+28.8'	111.8°	2
3	51°51.6'	+18.9'	103.3°	51°37.2'	+20.5'	104.5°	51°21.5'	+22.0'	105.8°	51°04.6'	+23.5'	106.9°	50°46.6'	+25.0'	108.1°	50°27.3'	+26.4'	109.3°	50°07.0'	+27.8'	110.4°	3
4	52°10.6'	+17.7'	101.8°	51°57.7'	+19.3'	103.0°	51°43.5'	+20.9'	104.3°	51°28.2'	+22.4'	105.5°	51°11.5'	+23.9'	106.7°	50°53.7'	+25.4'	107.9°	50°34.7'	+26.8'	109.0°	4
5	52°28.3'	+16.5'	100.2°	52°17.0'	+18.1'	101.5°	52°04.4'	+19.7'	102.7°	51°50.5'	+21.2'	104.0°	51°35.4'	+22.8'	105.2°	51°19.1'	+24.3'	106.4°	51°01.5'	+25.7'	107.6°	5
6	52°44.7'	+15.2'	98.6°	52°35.1'	+16.8'	99.9°	52°24.1'	+18.4'	101.2°	52°11.8'	+20.0'	102.5°	51°58.2'	+21.6'	103.7°	51°43.3'	+23.1'	104.9°	51°27.3'	+24.7'	106.2°	6
7	53°00.0'	+13.9'	97.0°	52°51.9'	+15.5'	98.3°	52°42.5'	+17.2'	99.6°	52°31.8'	+18.8'	100.9°	52°19.8'	+20.4'	102.2°	52°06.5'	+22.0'	103.4°	51°51.9'	+23.5'	104.7°	7
8	53°13.8'	+12.5'	95.4°	53°07.4'	+14.2'	96.7°	52°59.7'	+15.9'	98.0°	52°50.7'	+17.6'	99.4°	52°40.2'	+19.2'	100.6°	52°28.5'	+20.8'	101.9°	52°15.4'	+22.4'	103.2°	8
9	53°26.3'	+11.2'	93.8°	53°21.7'	+12.9'	95.1°	53°15.6'	+14.6'	96.4°	53°08.2'	+16.3'	97.8°	52°59.4'	+17.9'	99.1°	52°49.3'	+19.6'	100.4°	52°37.8'	+21.2'	101.7°	9
10	53°37.5'	+9.8'	92.1°	53°34.6'	+11.5'	93.5°	53°30.2'	+13.3'	94.8°	53°24.5'	+15.0'	96.2°	53°17.4'	+16.7'	97.5°	53°08.9'	+18.3'	98.8°	52°59.0'	+20.0'	100.1°	10
11	53°47.3'	+8.4'	90.4°	53°46.1'	+10.2'	91.8°	53°43.5'	+11.9'	93.2°	53°39.5'	+13.6'	94.5°	53°34.0'	+15.3'	95.9°	53°27.2'	+17.0'	97.2°	53°19.0'	+18.7'	98.6°	11
12	53°55.7'	+7.0'	88.8°	53°56.3'	+8.8'	90.1°	53°55.4'	+10.5'	91.5°	53°53.1'	+12.3'	92.9°	53°49.4'	+14.0'	94.2°	53°44.2'	+15.7'	95.6°	53°37.7'	+17.4'	97.0°	12
13	54°02.7'	+5.6'	87.1°	54°05.0'	+7.3'	88.4°	54°05.9'	+9.1'	89.8°	54°05.4'	+10.9'	91.2°	54°03.4'	+12.6'	92.6°	54°00.0'	+14.4'	94.0°	53°55.1'	+16.1'	95.3°	13
14	54°08.2'	+4.1'	85.4°	54°12.3'	+5.9'	86.8°	54°15.0'	+7.7'	88.1°	54°16.2'	+9.5'	89.5°	54°16.0'	+11.2'	90.9°	54°14.3'	+13.0'	92.3°	54°11.2'	+14.7'	93.7°	14
15	54°12.3'	+2.7'	83.7°	54°18.2'	+4.5'	85.1°	54°22.7'	+6.2'	86.4°	54°25.7'	+8.0'	87.8°	54°27.2'	+9.8'	89.2°	54°27.3'	+11.6'	90.6°	54°25.9'	+13.3'	92.0°	15
16	54°15.0'	+1.2'	82.0°	54°22.7'	+3.0'	83.3°	54°28.9'	+4.8'	84.7°	54°33.7'	+6.6'	86.1°	54°37.0'	+8.4'	87.5°	54°38.9'	+10.2'	88.9°	54°39.2'	+11.9'	90.4°	16
17	54°16.2'	-0.2'	80.2°	54°25.7'	+1.5'	81.6°	54°33.7'	+3.3'	83.0°	54°40.3'	+5.1'	84.4°	54°45.4'	+6.9'	85.8°	54°49.0'	+8.7'	87.2°	54°51.2'	+10.5'	88.7°	17
18	54°16.0'	-0.1'	78.5°	54°27.2'	+0.1'	79.9°	54°37.0'	+1.8'	81.3°	54°45.4'	+3.6'	82.7°	54°52.3'	+5.4'	84.1°	54°57.7'	+7.2'	85.5°	55°01.7'	+9.0'	86.9°	18
19	54°14.3'	-0.3'	76.8°	54°27.3'	-0.1'	78.2°	54°38.9'	+0.4'	79.6°	54°49.0'	+2.2'	81.0°	54°57.7'	+4.0'	82.4°	55°05.0'	+5.8'	83.8°	55°10.7'	+7.6'	85.2°	19
20	54°11.2'	-0.4'	75.1°	54°25.9'	-0.2'	76.5°	54°39.2'	-0.1'	77.8°	54°51.2'	+0.7'	79.2°	55°01.7'	+2.5'	80.6°	55°10.7'	+4.3'	82.0°	55°18.3'	+6.1'	83.5°	20
21	54°06.6'	-0.6'	73.4°	54°23.0'	-0.4'	74.7°	54°38.1'	-0.2'	76.1°	54°51.8'	-0.8'	77.5°	55°04.1'	+0.1'	78.9°	55°15.0'	+2.8'	80.3°	55°24.4'	+4.6'	81.7°	21
22	54°00.6'	-0.7'																				

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

38° 322° LHA

Latitude SAME as Declination

38° 322° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	49°52.3'	+22.0'	107.2°	49°34.0'	+23.4'	108.3°	49°14.6'	+24.8'	109.4°	48°54.1'	+26.2'	110.5°	48°32.5'	+27.5'	111.6°	48°10.0'	+28.8'	112.6°	47°46.4'	+30.1'	113.6°	0
1	50°14.3'	+20.9'	105.8°	49°57.4'	+22.4'	106.9°	49°39.4'	+23.8'	108.0°	49°20.3'	+25.2'	109.1°	49°00.1'	+26.6'	110.2°	48°38.8'	+27.9'	111.3°	48°16.5'	+29.2'	112.3°	1
2	50°35.2'	+19.8'	104.3°	50°19.8'	+21.3'	105.5°	50°03.2'	+22.7'	106.6°	49°45.5'	+24.2'	107.7°	49°26.6'	+25.6'	108.9°	49°06.7'	+27.0'	110.0°	48°45.7'	+28.3'	111.0°	2
3	50°54.9'	+18.6'	102.8°	50°41.0'	+20.1'	104.0°	50°25.9'	+21.6'	105.2°	50°09.7'	+23.1'	106.3°	49°52.2'	+24.6'	107.5°	49°33.7'	+26.0'	108.6°	49°14.0'	+27.3'	109.7°	3
4	51°13.5'	+17.4'	101.3°	51°01.2'	+19.0'	102.5°	50°47.6'	+20.5'	103.7°	50°32.8'	+22.0'	104.9°	50°16.8'	+23.5'	106.0°	49°59.6'	+24.9'	107.2°	49°41.3'	+26.4'	108.3°	4
5	51°30.9'	+16.2'	99.7°	51°20.1'	+17.8'	101.0°	51°08.1'	+19.4'	102.2°	50°54.8'	+20.9'	103.4°	50°40.3'	+22.4'	104.6°	50°24.6'	+23.9'	105.8°	50°07.7'	+25.3'	106.9°	5
6	51°47.1'	+15.0'	98.2°	51°37.9'	+16.6'	99.4°	51°27.5'	+18.2'	100.7°	51°15.7'	+19.7'	101.9°	51°02.7'	+21.3'	103.1°	50°48.5'	+22.8'	104.3°	50°33.0'	+24.3'	105.5°	6
7	52°02.1'	+13.7'	96.6°	51°54.5'	+15.3'	97.9°	51°45.6'	+17.0'	99.2°	51°35.4'	+18.6'	100.4°	51°24.0'	+20.1'	101.6°	51°11.3'	+21.7'	102.9°	50°57.3'	+23.2'	104.1°	7
8	52°15.8'	+12.4'	95.0°	52°09.9'	+14.1'	96.3°	52°02.6'	+15.7'	97.6°	51°54.0'	+17.3'	98.9°	51°44.1'	+18.9'	100.1°	51°32.9'	+20.5'	101.4°	51°20.5'	+22.1'	102.6°	8
9	52°28.2'	+11.1'	93.4°	52°23.9'	+12.8'	94.7°	52°18.3'	+14.4'	96.0°	52°11.3'	+16.1'	97.3°	52°03.1'	+17.7'	98.6°	51°53.4'	+19.3'	99.8°	51°42.5'	+20.9'	101.1°	9
10	52°39.3'	+09.8'	91.8°	52°36.7'	+11.5'	93.1°	52°32.8'	+13.2'	94.4°	52°27.4'	+14.8'	95.7°	52°20.8'	+16.5'	97.0°	52°12.8'	+18.1'	98.3°	52°03.5'	+19.7'	99.6°	10
11	52°49.1'	+08.4'	90.2°	52°48.2'	+10.1'	91.5°	52°45.9'	+11.8'	92.8°	52°42.3'	+13.5'	94.1°	52°37.3'	+15.2'	95.4°	52°30.9'	+16.9'	96.7°	52°23.2'	+18.5'	98.0°	11
12	52°57.5'	+07.1'	88.5°	52°58.3'	+08.8'	89.9°	52°57.7'	+10.5'	91.2°	52°55.8'	+12.2'	92.5°	52°52.5'	+13.9'	93.8°	52°47.8'	+15.6'	95.2°	52°41.7'	+17.2'	96.5°	12
13	53°04.5'	+05.7'	86.9°	53°07.1'	+07.4'	88.2°	53°08.2'	+09.1'	89.6°	53°08.0'	+10.9'	90.9°	53°06.4'	+12.6'	92.2°	53°03.3'	+14.3'	93.6°	52°58.9'	+16.0'	94.9°	13
14	53°10.2'	+04.3'	85.2°	53°14.5'	+06.0'	86.6°	53°17.4'	+07.8'	87.9°	53°18.9'	+09.5'	89.3°	53°18.9'	+11.2'	90.6°	53°17.6'	+12.9'	91.9°	53°14.9'	+14.7'	93.3°	14
15	53°14.5'	+02.9'	83.6°	53°20.5'	+04.6'	84.9°	53°25.1'	+06.4'	86.2°	53°28.4'	+08.1'	87.6°	53°30.2'	+09.9'	88.9°	53°30.6'	+11.6'	90.3°	53°29.5'	+13.3'	91.6°	15
16	53°17.4'	+01.5'	81.9°	53°25.1'	+03.2'	83.2°	53°31.5'	+05.0'	84.6°	53°36.5'	+06.7'	85.9°	53°40.0'	+08.5'	87.3°	53°42.2'	+10.2'	88.6°	53°42.9'	+12.0'	90.0°	16
17	53°18.9'	+00.1'	80.2°	53°28.4'	+01.8'	81.6°	53°36.5'	+03.6'	82.9°	53°43.2'	+05.3'	84.3°	53°48.5'	+07.1'	85.6°	53°52.4'	+08.8'	87.0°	53°54.8'	+10.6'	88.3°	17
18	53°18.9'	-01.3'	78.6°	53°30.2'	+00.4'	79.9°	53°40.0'	+02.1'	81.2°	53°48.5'	+03.9'	82.6°	53°55.5'	+05.6'	83.9°	54°01.2'	+07.4'	85.3°	54°05.4'	+09.2'	86.7°	18
19	53°17.6'	-02.7'	76.9°	53°30.6'	-01.0'	78.2°	53°42.2'	+00.7'	79.5°	53°52.4'	+02.4'	80.9°	54°01.2'	+04.2'	82.2°	54°08.6'	+06.0'	83.6°	54°14.5'	+07.7'	85.0°	19
20	53°14.9'	-04.1'	75.2°	53°29.5'	-02.4'	76.5°	53°42.9'	-00.7'	77.8°	53°54.8'	+01.0'	79.2°	54°05.4'	+02.8'	80.5°	54°14.5'	+04.5'	81.9°	54°22.3'	+06.3'	83.3°	20
21	53°10.8'	-05.5'	73.5°	53°27.1'	-03.8'	74.8°	53°42.1'	-02.1'	76.2°	53°55.8'	-00.4'	77.5°	54°08.1'	+01.3'	78.8°	54°19.1'	+03.1'	80.2°	54°28.6'	+04.8'	81.6°	21
22	53°05.2'	-06.9'	71.9°	53°23.3'	-05.2'	73.2°	53°40.0'	-03.6'	74.5°	53°55.4'	-01.9'	75.8°	54°09.5'	-00.1'	77.1°	54°22.1'	+01.6'	78.5°	54°33.4'	+03.4'	79.9°	22
23	52°58.4'	-08.3'	70.2°	53°18.0'	-06.6'	71.5°	53°36.4'	-05.0'	72.8°	53°53.5'	-03.3'	74.1°	54°09.3'	-01.6'	75.4°	54°23.7'	+00.2'	76.8°	54°36.8'	+01.9'	78.1°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

38° 322° LHA

Latitude SAME as Declination

38° 322° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

39° 321° LHA

Latitude SAME as Declination

39° 321° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	48°56.6'	+21.6'	106.6°	48°38.9'	+23.0'	107.7°	48°20.1'	+24.4'	108.8°	48°00.2'	+25.7'	109.9°	47°39.3'	+27.1'	110.9°	47°17.4'	+28.4'	111.9°	46°54.6'	+29.6'	112.9°	0
1	49°18.2'	+20.5'	105.2°	49°01.9'	+22.0'	106.3°	48°44.5'	+23.4'	107.4°	48°26.0'	+24.8'	108.5°	48°06.4'	+26.1'	109.6°	47°45.8'	+27.5'	110.6°	47°24.2'	+28.7'	111.6°	1
2	49°38.7'	+19.4'	103.8°	49°23.8'	+20.9'	104.9°	49°07.8'	+22.3'	106.0°	48°50.7'	+23.8'	107.1°	48°32.5'	+25.2'	108.2°	48°13.3'	+26.5'	109.3°	47°52.9'	+27.8'	110.3°	2
3	49°58.1'	+18.3'	102.3°	49°44.7'	+19.8'	103.5°	49°30.2'	+21.3'	104.6°	49°14.5'	+22.7'	105.7°	48°57.7'	+24.2'	106.8°	48°39.8'	+25.6'	107.9°	48°20.8'	+26.9'	109.0°	3
4	50°16.4'	+17.1'	100.8°	50°04.5'	+18.7'	102.0°	49°51.5'	+20.2'	103.1°	49°37.2'	+21.7'	104.3°	49°21.9'	+23.1'	105.4°	49°05.3'	+24.6'	106.5°	48°47.7'	+25.9'	107.6°	4
5	50°33.5'	+16.0'	99.3°	50°23.2'	+17.5'	100.5°	50°11.7'	+19.1'	101.7°	49°58.9'	+20.6'	102.8°	49°45.0'	+22.1'	104.0°	49°29.9'	+23.5'	105.1°	49°13.6'	+25.0'	106.3°	5
6	50°49.5'	+14.8'	97.8°	50°40.7'	+16.4'	99.0°	50°30.7'	+17.9'	100.2°	50°19.5'	+19.5'	101.4°	50°07.1'	+21.0'	102.6°	49°53.4'	+22.5'	103.7°	49°38.6'	+23.9'	104.9°	6
7	51°04.3'	+13.5'	96.2°	50°57.1'	+15.1'	97.5°	50°48.7'	+16.7'	98.7°	50°39.0'	+18.3'	99.9°	50°28.0'	+19.9'	101.1°	50°15.9'	+21.4'	102.3°	50°02.5'	+22.9'	103.4°	7
8	51°17.8'	+12.3'	94.7°	51°12.2'	+13.9'	95.9°	51°05.4'	+15.5'	97.2°	50°57.3'	+17.1'	98.4°	50°47.9'	+18.7'	99.6°	50°37.3'	+20.3'	100.8°	50°25.4'	+21.8'	102.0°	8
9	51°30.1'	+11.0'	93.1°	51°26.2'	+12.7'	94.4°	51°20.9'	+14.3'	95.6°	51°14.4'	+15.9'	96.9°	51°06.6'	+17.5'	98.1°	50°57.5'	+19.1'	99.3°	50°47.2'	+20.7'	100.5°	9
10	51°41.1'	+09.7'	91.5°	51°38.8'	+11.4'	92.8°	51°35.2'	+13.1'	94.1°	51°30.3'	+14.7'	95.3°	51°24.1'	+16.3'	96.6°	51°16.6'	+17.9'	97.8°	51°07.8'	+19.5'	99.0°	10
11	51°50.8'	+08.4'	89.9°	51°50.2'	+10.1'	91.2°	51°48.3'	+11.8'	92.5°	51°45.0'	+13.4'	93.8°	51°40.4'	+15.1'	95.0°	51°34.5'	+16.7'	96.3°	51°27.3'	+18.3'	97.5°	11
12	51°59.3'	+07.1'	88.3°	52°00.3'	+08.8'	89.6°	52°00.1'	+10.5'	90.9°	51°58.5'	+12.2'	92.2°	51°55.5'	+13.8'	93.5°	51°51.2'	+15.5'	94.7°	51°45.6'	+17.1'	96.0°	12
13	52°06.4'	+05.8'	86.7°	52°09.2'	+07.5'	88.0°	52°10.6'	+09.2'	89.3°	52°10.6'	+10.9'	90.6°	52°09.3'	+12.5'	91.9°	52°06.7'	+14.2'	93.2°	52°02.7'	+15.9'	94.4°	13
14	52°12.2'	+04.4'	85.1°	52°16.6'	+06.1'	86.4°	52°19.7'	+07.8'	87.7°	52°21.5'	+09.5'	89.0°	52°21.9'	+11.2'	90.3°	52°20.9'	+12.9'	91.6°	52°18.6'	+14.6'	92.9°	14
15	52°16.6'	+03.1'	83.5°	52°22.8'	+04.8'	84.8°	52°27.6'	+06.5'	86.1°	52°31.0'	+08.2'	87.4°	52°33.1'	+09.9'	88.7°	52°33.8'	+11.6'	90.0°	52°33.2'	+13.3'	91.3°	15
16	52°19.7'	+01.7'	81.8°	52°27.6'	+03.4'	83.1°	52°34.1'	+05.1'	84.4°	52°39.2'	+06.9'	85.7°	52°43.0'	+08.6'	87.0°	52°45.4'	+10.3'	88.4°	52°46.5'	+12.0'	89.7°	16
17	52°21.5'	+00.4'	80.2°	52°31.0'	+02.1'	81.5°	52°39.2'	+03.8'	82.8°	52°46.1'	+05.5'	84.1°	52°51.6'	+07.2'	85.4°	52°55.7'	+08.9'	86.7°	52°58.5'	+10.6'	88.0°	17
18	52°21.9'	-01.0'	78.6°	52°33.1'	+00.7'	79.8°	52°43.0'	+02.4'	81.1°	52°51.6'	+04.1'	82.4°	52°58.8'	+05.8'	83.8°	53°04.6'	+07.6'	85.1°	53°09.1'	+09.3'	86.4°	18
19	52°20.9'	-02.3'	76.9°	52°33.8'	-00.7'	78.2°	52°45.4'	+01.0'	79.5°	52°55.7'	+02.7'	80.8°	53°04.6'	+04.5'	82.1°	53°12.2'	+06.2'	83.4°	53°18.4'	+07.9'	84.8°	19
20	52°18.6'	-03.7'	75.3°	52°33.2'	-02.0'	76.6°	52°46.5'	-00.3'	77.8°	52°58.5'	+01.4'	79.1°	53°09.1'	+03.1'	80.4°	53°18.4'	+04.8'	81.8°	53°26.3'	+06.5'	83.1°	20
21	52°14.9'	-05.0'	73.7°	52°31.2'	-03.4'	74.9°	52°46.1'	-01.7'	76.2°	52°59.8'	00.0'	77.5°	53°12.2'	+01.7'								

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

40° 320° LHA

Latitude SAME as Declination

40° 320° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	48°00.7'	+21.2'	106.1°	47°43.6'	+22.6'	107.1°	47°25.4'	+24.0'	108.2°	47°06.1'	+25.3'	109.2°	46°45.9'	+26.6'	110.2°	46°24.7'	+27.9'	111.2°	46°02.5'	+29.1'	112.2°	0
1	48°21.9'	+20.1'	104.7°	48°06.2'	+21.6'	105.8°	47°49.3'	+23.0'	106.8°	47°31.5'	+24.4'	107.9°	47°12.5'	+25.7'	108.9°	46°52.6'	+27.0'	109.9°	46°31.7'	+28.3'	110.9°	1
2	48°42.1'	+19.1'	103.3°	48°27.8'	+20.5'	104.4°	48°12.3'	+22.0'	105.4°	47°55.8'	+23.4'	106.5°	47°38.2'	+24.8'	107.6°	47°19.6'	+26.1'	108.6°	47°00.0'	+27.4'	109.6°	2
3	49°01.2'	+18.0'	101.8°	48°48.3'	+19.5'	102.9°	48°34.3'	+20.9'	104.0°	48°19.2'	+22.4'	105.1°	48°03.0'	+23.8'	106.2°	47°45.7'	+25.2'	107.3°	47°27.4'	+26.5'	108.3°	3
4	49°19.2'	+16.9'	100.4°	49°07.8'	+18.4'	101.5°	48°55.3'	+19.9'	102.6°	48°41.6'	+21.3'	103.7°	48°26.8'	+22.8'	104.8°	48°10.9'	+24.2'	105.9°	47°53.9'	+25.6'	107.0°	4
5	49°36.0'	+15.7'	98.9°	49°26.2'	+17.3'	100.0°	49°15.1'	+18.8'	101.2°	49°02.9'	+20.3'	102.3°	48°49.5'	+21.7'	103.4°	48°35.0'	+23.2'	104.5°	48°19.4'	+24.6'	105.6°	5
6	49°51.8'	+14.6'	97.4°	49°43.5'	+16.1'	98.6°	49°33.9'	+17.7'	99.7°	49°23.2'	+19.2'	100.9°	49°11.3'	+20.7'	102.0°	48°58.2'	+22.2'	103.1°	48°44.0'	+23.6'	104.2°	6
7	50°06.4'	+13.4'	95.9°	49°59.6'	+15.0'	97.1°	49°51.6'	+16.5'	98.2°	49°42.4'	+18.1'	99.4°	49°32.0'	+19.6'	100.6°	49°20.4'	+21.1'	101.7°	49°07.6'	+22.6'	102.8°	7
8	50°19.8'	+12.2'	94.4°	50°14.6'	+13.8'	95.6°	50°08.1'	+15.4'	96.7°	50°00.5'	+16.9'	97.9°	49°51.6'	+18.5'	99.1°	49°41.5'	+20.0'	100.3°	49°30.2'	+21.5'	101.4°	8
9	50°31.9'	+11.0'	92.8°	50°28.4'	+12.6'	94.0°	50°23.5'	+14.2'	95.2°	50°17.4'	+15.8'	96.4°	50°10.1'	+17.3'	97.6°	50°01.5'	+18.9'	98.8°	49°51.7'	+20.4'	100.0°	9
10	50°42.9'	+9.7'	91.3°	50°40.9'	+11.4'	92.5°	50°37.7'	+13.0'	93.7°	50°33.2'	+14.6'	94.9°	50°27.4'	+16.2'	96.1°	50°20.4'	+17.7'	97.3°	50°12.1'	+19.3'	98.5°	10
11	50°52.6'	+8.5'	89.7°	50°52.3'	+10.1'	90.9°	50°50.7'	+11.7'	92.2°	50°47.8'	+13.4'	93.4°	50°43.6'	+15.0'	94.6°	50°38.1'	+16.6'	95.8°	50°31.4'	+18.1'	97.0°	11
12	51°01.1'	+7.2'	88.1°	51°02.4'	+8.8'	89.4°	51°02.4'	+10.5'	90.6°	51°01.1'	+12.1'	91.8°	50°58.5'	+13.8'	93.1°	50°54.7'	+15.4'	94.3°	50°49.5'	+17.0'	95.5°	12
13	51°08.3'	+5.9'	86.6°	51°11.2'	+7.6'	87.8°	51°12.9'	+9.2'	89.0°	51°13.2'	+10.9'	90.3°	51°12.3'	+12.5'	91.5°	51°10.0'	+14.1'	92.8°	51°06.5'	+15.8'	94.0°	13
14	51°14.2'	+4.6'	85.0°	51°18.8'	+6.3'	86.2°	51°22.1'	+7.9'	87.5°	51°24.1'	+9.6'	88.7°	51°24.8'	+11.3'	90.0°	51°24.2'	+12.9'	91.2°	51°22.3'	+14.5'	92.5°	14
15	51°18.8'	+3.3'	83.4°	51°25.1'	+5.0'	84.6°	51°30.1'	+6.6'	85.9°	51°33.7'	+8.3'	87.1°	51°36.1'	+10.0'	88.4°	51°37.1'	+11.6'	89.6°	51°36.8'	+13.3'	90.9°	15
16	51°22.1'	+2.0'	81.8°	51°30.1'	+3.7'	83.0°	51°36.7'	+5.3'	84.3°	51°42.0'	+7.0'	85.5°	51°46.0'	+8.7'	86.8°	51°48.7'	+10.4'	88.1°	51°50.1'	+12.0'	89.3°	16
17	51°24.1'	+0.7'	80.2°	51°33.7'	+2.3'	81.4°	51°42.0'	+4.0'	82.7°	51°49.0'	+5.7'	83.9°	51°54.7'	+7.4'	85.2°	51°59.1'	+9.0'	86.5°	52°02.1'	+10.7'	87.7°	17
18	51°24.8'	-0.6'	78.6°	51°36.1'	+0.1'	79.8°	51°46.0'	+2.7'	81.1°	51°54.7'	+4.4'	82.3°	52°02.1'	+6.0'	83.6°	52°08.1'	+7.7'	84.9°	52°12.8'	+9.4'	86.1°	18
19	51°24.2'	-1.9'	77.0°	51°37.1'	-0.3'	78.2°	51°48.7'	+1.4'	79.4°	51°59.1'	+3.0'	80.7°	52°08.1'	+4.7'	82.0°	52°15.9'	+6.4'	83.2°	52°22.2'	+8.1'	84.5°	19
20	51°22.3'	-3.2'	75.4°	51°36.8'	-1.6'	76.6°	51°50.1'	+0.0'	77.8°	52°02.1'	+1.7'	79.1°	52°12.8'	+3.4'	80.3°	52°22.2'	+5.0'	81.6°	52°30.3'	+6.7'	82.9°	20
21	51°19.0'	-4.5'	73.8°	51°35.2'	-2.9'	75.0°	51°50.1'	-1.3'	76.2°	52°03.8'	+0.3'	77.4°	52°16.2'	+2.0'	78.7°	52°27.3'	+3.7'	80.0°	52°37.1'	+5.4'	81.3°	21
22	51°14.5'	-5.8'	72.2°	51°32.3'	-4.2'	73.4°	51°48.8'	-2.6'	74.6°	52°04.1'	-1.0'	75.8°	52°18.2'	+0.7'	77.1°	52°31.0'	+2.3'	78.3°	52°42.5'	+4.0'	79.6°	22
23	51°08.7'	-7.1'	70.6°	51°28.0'	-5.6'	71.8°	51°46.2'	-4.0'	73.0°	52°03.2'	-2.3'	74.2°	52°18.9'	-0.7'	75.4°	52°33.3'	+1.0'	76.7°	52°46.5'	+2.6'	78.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

40° 320° LHA

Latitude SAME as Declination

40° 320° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

41° 319° LHA

Latitude SAME as Declination

41° 319° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	47°04.7'	+20.8'	105.6°	46°48.1'	+22.2'	106.6°	46°30.5'	+23.6'	107.6°	46°11.9'	+24.9'	108.6°	45°52.2'	+26.2'	109.6°	45°31.7'	+27.5'	110.5°	45°10.2'	+28.7'	111.5°	0
1	47°25.5'	+19.8'	104.2°	47°10.3'	+21.2'	105.2°	46°54.1'	+22.6'	106.3°	46°36.8'	+24.0'	107.3°	46°18.4'	+25.3'	108.3°	45°59.1'	+26.6'	109.3°	45°38.9'	+27.9'	110.2°	1
2	47°45.4'	+18.8'	102.8°	47°31.6'	+20.2'	103.8°	47°16.7'	+21.6'	104.9°	47°00.7'	+23.0'	105.9°	46°43.7'	+24.4'	107.0°	46°25.7'	+25.7'	108.0°	46°06.7'	+27.0'	109.0°	2
3	48°04.1'	+17.7'	101.4°	47°51.8'	+19.2'	102.4°	47°38.3'	+20.6'	103.5°	47°23.7'	+22.0'	104.6°	47°08.1'	+23.4'	105.6°	46°51.4'	+24.8'	106.6°	46°33.7'	+26.1'	107.7°	3
4	48°21.9'	+16.6'	99.9°	48°10.9'	+18.1'	101.0°	47°58.9'	+19.6'	102.1°	47°45.8'	+21.0'	103.2°	47°31.5'	+22.4'	104.3°	47°16.2'	+23.8'	105.3°	46°59.9'	+25.2'	106.3°	4
5	48°38.5'	+15.5'	98.5°	48°29.1'	+17.0'	99.6°	48°18.5'	+18.5'	100.7°	48°06.8'	+20.0'	101.8°	47°54.0'	+21.4'	102.9°	47°40.1'	+22.9'	104.0°	47°25.1'	+24.3'	105.0°	5
6	48°54.0'	+14.4'	97.0°	48°46.1'	+15.9'	98.1°	48°37.0'	+17.5'	99.3°	48°26.8'	+18.9'	100.4°	48°15.4'	+20.4'	101.5°	48°02.9'	+21.9'	102.6°	47°49.3'	+23.3'	103.7°	6
7	49°08.4'	+13.3'	95.5°	49°02.1'	+14.8'	96.7°	48°54.5'	+16.3'	97.8°	48°45.8'	+17.9'	98.9°	48°35.8'	+19.4'	100.1°	48°24.8'	+20.8'	101.2°	48°12.6'	+22.3'	102.3°	7
8	49°21.7'	+12.1'	94.0°	49°16.9'	+13.7'	95.2°	49°10.8'	+15.2'	96.3°	49°03.6'	+16.8'	97.5°	48°55.2'	+18.3'	98.6°	48°45.6'	+19.8'	99.8°	48°34.9'	+21.2'	100.9°	8
9	49°33.8'	+10.9'	92.5°	49°30.5'	+12.5'	93.7°	49°26.1'	+14.1'	94.9°	49°20.4'	+15.6'	96.0°	49°13.5'	+17.2'	97.2°	49°05.4'	+18.7'	98.3°	48°56.1'	+20.2'	99.5°	9
10	49°44.7'	+9.7'	91.0°	49°43.0'	+11.3'	92.2°	49°40.1'	+12.9'	93.4°	49°36.0'	+14.5'	94.5°	49°30.6'	+16.0'	95.7°	49°24.1'	+17.6'	96.9°	49°16.3'	+19.1'	98.0°	10
11	49°54.4'	+8.5'	89.5°	49°54.3'	+10.1'	90.7°	49°53.0'	+11.7'	91.8°	49°50.5'	+13.3'	93.0°	49°46.7'	+14.9'	94.2°	49°41.7'	+16.4'	95.4°	49°35.4'	+18.0'	96.6°	11
12	50°02.9'	+7.3'	87.9°	50°04.4'	+8.9'	89.1°	50°04.7'	+10.5'	90.3°	50°03.8'	+12.1'	91.5°	50°01.6'	+13.7'	92.7°	49°58.1'	+15.3'	93.9°	49°53.4'	+16.9'	95.1°	12
13	50°10.2'	+6.0'	86.4°	50°13.3'	+7.7'	87.6°	50°15.2'	+9.3'	88.8°	50°15.9'	+10.9'	90.0°	50°15.3'	+12.5'	91.2°	50°13.4'	+14.1'	92.4°	50°10.2'	+15.7'	93.6°	13
14	50°16.2'	+4.8'	84.8°	50°21.0'	+6.4'	86.0°	50°24.5'	+8.0'	87.2°	50°26.8'	+9.7'	88.4°	50°27.8'	+11.3'	89.7°	50°27.5'	+12.9'	90.9°	50°25.9'	+14.5'	92.1°	14
15	50°21.0'	+3.5'	83.3°	50°27.4'	+5.1'	84.5°	50°32.5'	+6.8'	85.7°	50°36.4'	+8.4'	86.9°	50°39.0'	+10.0'	88.1°	50°40.4'	+11.7'	89.3°	50°40.4'	+13.3'	90.6°	15
16	50°24.5'	+2.3'	81.7°	50°32.5'	+3.9'	82.9°	50°39.3'	+5.5'	84.1°	50°44.8'	+7.2'	85.3°	50°49.1'	+8.8'	86.6°	50°52.0'	+10.4'	87.8°	50°53.7'	+12.1'	89.0°	16
17	50°26.8'	+1.0'	80.1°	50°36.4'	+2.6'	81.3°	50°44.8'	+4.2'	82.5°	50°52.0'	+5.9'	83.8°	50°57.9'	+7.5'	85.0°	51°02.5'	+9.2'	86.2°	51°05.8'	+10.8'	87.5°	17
18	50°27.8'	-0.3'	78.6°	50°39.0'	+1.3'	79.8°	50°49.1'	+3.0'	81.0°	50°57.9'	+4.6'	82.2°	51°05.4'	+6.2'	83.4°	51°11.6'	+7.9'	84.6°	51°16.6'	+9.5'	85.9°	18
19	50°27.5'	-1.5'	77.0°	50°40.4'	+0.1'	78.2°	50°52.0'	+1.7'	79.4°	51°02.5'	+3.3'	80.6°	51°11.6'	+5.0'	81.8°	51°19.5'	+6.6'	83.1°	51°26.1'	+8.3'	84.3°	19
20	50°25.9'	-2.8'	75.4°	50°40.4'	-1.2'	76.6°	50°53.7'	+0.4'	77.8°	51°05.8'	+2.0'	79.0°	51°16.6'	+3.7'	80.2°	51°26.1'	+5.3'	81.5°	51°34.4'	+7.0'	82.7°	20
21	50°23.1'	-4.1'	73.9°	50°39.2'	-2.5'	75.0°	50°54.1'	-0.9'	76.2°	51°07.8'	+0.7'	77.4°	51°20.2'	+2.3'	78.6°	51°31.4'	+4.0'	79.9°	51°41.4'	+5.6'	81.1°	21
22	50°19.0'	-5.3'	72.																			

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

42° 318° LHA

Latitude SAME as Declination

42° 318° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	46°08.6'	+20.5'	105.0°	45°52.5'	+21.8'	106.0°	45°35.4'	+23.2'	107.0°	45°17.4'	+24.5'	108.0°	44°58.4'	+25.8'	108.9°	44°38.4'	+27.0'	109.9°	44°17.6'	+28.3'	110.8°	0
1	46°29.0'	+19.5'	103.7°	46°14.3'	+20.9'	104.7°	45°58.6'	+22.2'	105.7°	45°41.9'	+23.6'	106.7°	45°24.2'	+24.9'	107.7°	45°05.5'	+26.2'	108.6°	44°45.9'	+27.5'	109.6°	1
2	46°48.5'	+18.5'	102.3°	46°35.2'	+19.9'	103.3°	46°20.9'	+21.3'	104.4°	46°05.5'	+22.7'	105.4°	45°49.1'	+24.0'	106.4°	45°31.7'	+25.3'	107.3°	45°13.3'	+26.6'	108.3°	2
3	47°07.0'	+17.5'	100.9°	46°55.1'	+18.9'	102.0°	46°42.2'	+20.3'	103.0°	46°28.1'	+21.7'	104.0°	46°13.1'	+23.1'	105.0°	45°57.0'	+24.4'	106.0°	45°39.9'	+25.7'	107.0°	3
4	47°24.5'	+16.4'	99.5°	47°14.0'	+17.9'	100.6°	47°02.5'	+19.3'	101.6°	46°49.8'	+20.7'	102.7°	46°36.2'	+22.1'	103.7°	46°21.4'	+23.5'	104.7°	46°05.7'	+24.9'	105.7°	4
5	47°40.9'	+15.3'	98.1°	47°31.9'	+16.8'	99.2°	47°21.8'	+18.3'	100.2°	47°10.6'	+19.7'	101.3°	46°58.3'	+21.2'	102.3°	46°44.9'	+22.6'	103.4°	46°30.5'	+23.9'	104.4°	5
6	47°56.2'	+14.2'	96.6°	47°48.7'	+15.8'	97.7°	47°40.1'	+17.2'	98.8°	47°30.3'	+18.7'	99.9°	47°19.5'	+20.2'	101.0°	47°07.5'	+21.6'	102.0°	46°54.5'	+23.0'	103.1°	6
7	48°10.5'	+13.1'	95.2°	48°04.5'	+14.7'	96.3°	47°57.3'	+16.2'	97.4°	47°49.0'	+17.7'	98.5°	47°39.6'	+19.1'	99.6°	47°29.1'	+20.6'	100.7°	47°17.4'	+22.0'	101.7°	7
8	48°23.6'	+12.0'	93.7°	48°19.1'	+13.6'	94.8°	48°13.5'	+15.1'	96.0°	48°06.7'	+16.6'	97.1°	47°58.7'	+18.1'	98.2°	47°49.7'	+19.6'	99.3°	47°39.4'	+21.0'	100.3°	8
9	48°35.6'	+10.9'	92.2°	48°32.7'	+12.4'	93.4°	48°28.6'	+14.0'	94.5°	48°23.3'	+15.5'	95.6°	48°16.8'	+17.0'	96.7°	48°09.2'	+18.5'	97.8°	48°00.5'	+20.0'	98.9°	9
10	48°46.5'	+09.7'	90.7°	48°45.1'	+11.3'	91.9°	48°42.5'	+12.8'	93.0°	48°38.8'	+14.4'	94.2°	48°33.8'	+15.9'	95.3°	48°27.7'	+17.4'	96.4°	48°20.4'	+18.9'	97.5°	10
11	48°56.2'	+08.5'	89.2°	48°56.4'	+10.1'	90.4°	48°55.4'	+11.7'	91.5°	48°53.2'	+13.2'	92.7°	48°49.8'	+14.8'	93.8°	48°45.2'	+16.3'	95.0°	48°39.4'	+17.8'	96.1°	11
12	49°04.7'	+07.3'	87.7°	49°06.5'	+08.9'	88.9°	49°07.1'	+10.5'	90.0°	49°06.4'	+12.1'	91.2°	49°04.5'	+13.7'	92.4°	49°01.5'	+15.2'	93.5°	48°57.2'	+16.7'	94.7°	12
13	49°12.1'	+06.2'	86.2°	49°15.4'	+07.7'	87.4°	49°17.6'	+09.3'	88.5°	49°18.5'	+10.9'	89.7°	49°18.2'	+12.5'	90.9°	49°16.7'	+14.1'	92.0°	49°14.0'	+15.6'	93.2°	13
14	49°18.2'	+04.9'	84.7°	49°23.2'	+06.5'	85.9°	49°26.9'	+08.1'	87.0°	49°29.4'	+09.7'	88.2°	49°30.7'	+11.3'	89.4°	49°30.7'	+12.9'	90.5°	49°29.6'	+14.5'	91.7°	14
15	49°23.2'	+03.7'	83.2°	49°29.7'	+05.3'	84.3°	49°35.0'	+06.9'	85.5°	49°39.1'	+08.5'	86.7°	49°42.0'	+10.1'	87.8°	49°43.6'	+11.7'	89.0°	49°44.1'	+13.3'	90.2°	15
16	49°26.9'	+02.5'	81.6°	49°36.0'	+04.1'	82.8°	49°42.0'	+05.7'	84.0°	49°47.7'	+07.3'	85.1°	49°52.1'	+08.9'	86.3°	49°55.4'	+10.5'	87.5°	49°57.4'	+12.1'	88.7°	16
17	49°29.4'	+01.3'	80.1°	49°39.1'	+02.9'	81.3°	49°47.7'	+04.5'	82.4°	49°55.0'	+06.1'	83.6°	50°01.0'	+07.7'	84.8°	50°05.9'	+09.3'	86.0°	50°09.5'	+10.9'	87.2°	17
18	49°30.7'	+00.1'	78.6°	49°42.0'	+01.6'	79.7°	49°52.1'	+03.2'	80.9°	50°01.0'	+04.8'	82.0°	50°08.7'	+06.4'	83.2°	50°15.2'	+08.1'	84.4°	50°20.4'	+09.7'	85.6°	18
19	49°30.7'	-01.2'	77.0°	49°43.6'	+00.4'	78.2°	49°55.4'	+02.0'	79.3°	50°05.9'	+03.6'	80.5°	50°15.2'	+05.2'	81.7°	50°23.2'	+06.8'	82.9°	50°30.0'	+08.4'	84.1°	19
20	49°29.6'	-02.4'	75.5°	49°44.1'	-00.8'	76.6°	49°57.4'	+00.7'	77.8°	50°09.5'	+02.3'	78.9°	50°20.4'	+03.9'	80.1°	50°30.0'	+05.6'	81.3°	50°38.5'	+07.2'	82.5°	20
21	49°27.2'	-03.6'	73.9°	49°43.2'	-02.1'	75.1°	49°58.1'	-00.5'	76.2°	50°11.8'	+01.1'	77.4°	50°24.3'	+02.7'	78.6°	50°35.6'	+04.3'	79.7°	50°45.7'	+05.9'	81.0°	21
22	49°23.6'	-04.8'	72.4°	49°41.2'	-03.3'	73.5°	49°57.6'	-01.7'	74.7°	50°12.9'	-00.2'	75.8°	50°27.0'	+01.4'	77.0°	50°39.9'	+03.0'	78.2°	50°51.6'	+04.6'	79.4°	22
23	49°18.7'	-06.0'	70.9°	49°37.9'	-04.5'	72.0°	49°55.9'	-03.0'	73.1°	50°12.7'	-01.4'	74.3°	50°28.4'	+00.1'	75.4°	50°42.9'	+01.7'	76.6°	50°56.2'	+03.4'	77.8°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

42° 318° LHA

Latitude SAME as Declination

42° 318° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

43° 317° LHA

Latitude SAME as Declination

43° 317° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	45°12.3'	+20.1'	104.5°	44°56.7'	+21.5'	105.5°	44°40.2'	+22.8'	106.5°	44°22.7'	+24.1'	107.4°	44°04.3'	+25.4'	108.3°	43°45.0'	+26.6'	109.2°	43°24.8'	+27.9'	110.1°	0
1	45°32.4'	+19.2'	103.2°	45°18.2'	+20.6'	104.2°	45°03.0'	+21.9'	105.2°	44°46.8'	+23.2'	106.1°	44°29.7'	+24.5'	107.1°	44°11.6'	+25.8'	108.0°	43°52.6'	+27.1'	108.9°	1
2	45°51.6'	+18.2'	101.8°	45°38.8'	+19.6'	102.8°	45°24.9'	+21.0'	103.8°	45°10.1'	+22.3'	104.8°	44°54.2'	+23.7'	105.8°	44°37.4'	+25.0'	106.7°	44°19.7'	+26.2'	107.7°	2
3	46°09.8'	+17.2'	100.5°	45°58.4'	+18.6'	101.5°	45°45.9'	+20.0'	102.5°	45°32.4'	+21.4'	103.5°	45°17.9'	+22.8'	104.5°	45°02.4'	+24.1'	105.5°	44°45.9'	+25.4'	106.4°	3
4	46°27.0'	+16.2'	99.1°	46°17.0'	+17.6'	100.1°	46°05.9'	+19.1'	101.1°	45°53.8'	+20.5'	102.2°	45°40.7'	+21.8'	103.2°	45°26.5'	+23.2'	104.2°	45°11.3'	+24.5'	105.1°	4
5	46°43.2'	+15.2'	97.7°	46°34.6'	+16.6'	98.7°	46°25.0'	+18.1'	99.8°	46°14.3'	+19.5'	100.8°	46°02.5'	+20.9'	101.8°	45°49.7'	+22.3'	102.8°	45°35.8'	+23.6'	103.8°	5
6	46°58.4'	+14.1'	96.3°	46°51.3'	+15.6'	97.3°	46°43.1'	+17.0'	98.4°	46°33.8'	+18.5'	99.4°	46°23.4'	+19.9'	100.5°	46°12.0'	+21.3'	101.5°	45°59.5'	+22.7'	102.5°	6
7	47°12.5'	+13.0'	94.8°	47°06.8'	+14.5'	95.9°	47°00.1'	+16.0'	97.0°	46°52.3'	+17.5'	98.0°	46°43.3'	+18.9'	99.1°	46°33.3'	+20.4'	100.1°	46°22.2'	+21.8'	101.2°	7
8	47°25.5'	+11.9'	93.4°	47°21.4'	+13.5'	94.5°	47°16.1'	+15.0'	95.6°	47°09.7'	+16.4'	96.6°	47°02.2'	+17.9'	97.7°	46°53.6'	+19.4'	98.8°	46°43.9'	+20.8'	99.8°	8
9	47°37.4'	+10.8'	92.0°	47°34.8'	+12.4'	93.0°	47°31.1'	+13.9'	94.1°	47°26.2'	+15.4'	95.2°	47°20.1'	+16.9'	96.3°	47°13.0'	+18.3'	97.4°	47°04.7'	+19.8'	98.4°	9
10	47°48.3'	+09.7'	90.5°	47°47.2'	+11.2'	91.6°	47°44.9'	+12.8'	92.7°	47°41.5'	+14.3'	93.8°	47°37.0'	+15.8'	94.9°	47°31.3'	+17.3'	96.0°	47°24.5'	+18.8'	97.1°	10
11	47°58.0'	+08.6'	89.0°	47°58.4'	+10.1'	90.1°	47°57.7'	+11.7'	91.2°	47°55.8'	+13.2'	92.3°	47°52.8'	+14.7'	93.5°	47°48.6'	+16.2'	94.6°	47°43.3'	+17.7'	95.7°	11
12	48°06.6'	+07.4'	87.5°	48°08.6'	+09.0'	88.7°	48°09.4'	+10.5'	89.8°	48°09.0'	+12.1'	90.9°	48°07.5'	+13.6'	92.0°	48°04.8'	+15.1'	93.1°	48°01.0'	+16.7'	94.2°	12
13	48°14.0'	+06.3'	86.1°	48°17.5'	+07.8'	87.2°	48°19.9'	+09.4'	88.3°	48°21.1'	+10.9'	89.4°	48°21.1'	+12.5'	90.5°	48°20.0'	+14.0'	91.7°	48°17.7'	+15.6'	92.8°	13
14	48°20.3'	+05.1'	84.6°	48°25.4'	+06.7'	85.7°	48°29.3'	+08.2'	86.8°	48°32.1'	+09.8'	87.9°	48°33.6'	+11.4'	89.1°	48°34.0'	+12.9'	90.2°	48°33.2'	+14.5'	91.3°	14
15	48°25.4'	+03.9'	83.1°	48°32.0'	+05.5'	84.2°	48°37.5'	+07.1'	85.3°	48°41.9'	+08.6'	86.4°	48°45.0'	+10.2'	87.6°	48°46.9'	+11.8'	88.7°	48°47.7'	+13.3'	89.9°	15
16	48°29.3'	+02.8'	81.6°	48°37.5'	+04.3'	82.7°	48°44.6'	+05.9'	83.8°	48°50.5'	+07.5'	84.9°	48°55.2'	+09.0'	86.1°	48°58.7'	+10.6'	87.2°	49°01.0'	+12.2'	88.4°	16
17	48°32.1'	+01.6'	80.0°	48°41.9'	+03.1'	81.2°	48°50.5'	+04.7'	82.3°	48°57.9'	+06.3'	83.4°	49°04.2'	+07.8'	84.6°	49°09.3'	+09.4'	85.7°	49°13.2'	+11.0'	86.9°	17
18	48°33.6'	+00.4'	78.5°	48°45.0'	+01.9'	79.6°	48°55.2'	+03.5'	80.8°	49°04.2'	+05.1'	81.9°	49°12.1'	+06.7'	83.1°	49°18.7'	+08.2'	84.2°	49°24.2'	+09.8'	85.4°	18
19	48°34.0'	-00.8'	77.0°	48°46.9'	+00.7'	78.1°	48°58.7'	+02.3'	79.3°	49°09.3'	+03.9'	80.4°	49°18.7'	+05.4'	81.5°	49°26.9'	+07.0'	82.7°	49°34.0'	+08.6'	83.9°	19
20	48°33.2'	-02.0'	75.5°	48°47.7'	-00.5'	76.6°	49°01.0'	+01.1'	77.7°	49°13.2'	+02.7'	78.9°	49°24.2'	+04.2'	80.0°	49°34.0'	+05.8'	81.2°	49°42.6'	+07.4'	82.3°	20
21	48°31.2'	-03.2'	74.0°	48°47.2'	-01.6'	75.1°	49°02.1'	-00.1'	76.2°	49°15.8'	+01.4'	77.3°	49°28.4'	+03.0'	78							

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

44° 316° LHA

Latitude SAME as Declination

44° 316° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	44°15.9'	+19.8'	104.1°	44°00.8'	+21.1'	105.0°	43°44.8'	+22.5'	105.9°	43°27.9'	+23.8'	106.8°	43°10.0'	+25.0'	107.7°	42°51.3'	+26.3'	108.6°	42°31.7'	+27.5'	109.5°	0
1	44°35.7'	+18.9'	102.7°	44°22.0'	+20.2'	103.7°	44°07.3'	+21.6'	104.6°	43°51.6'	+22.9'	105.6°	43°35.1'	+24.2'	106.5°	43°17.6'	+25.4'	107.4°	42°59.2'	+26.7'	108.3°	1
2	44°54.6'	+17.9'	101.4°	44°42.2'	+19.3'	102.4°	44°28.9'	+20.7'	103.3°	44°14.5'	+22.0'	104.3°	43°59.2'	+23.3'	105.2°	43°43.0'	+24.6'	106.2°	43°25.9'	+25.9'	107.1°	2
3	45°12.5'	+17.0'	100.1°	45°01.5'	+18.4'	101.0°	44°49.5'	+19.8'	102.0°	44°36.5'	+21.1'	103.0°	44°22.6'	+22.5'	103.9°	44°07.6'	+23.8'	104.9°	43°51.8'	+25.1'	105.8°	3
4	45°29.5'	+16.0'	98.7°	45°19.9'	+17.4'	99.7°	45°09.3'	+18.8'	100.7°	44°57.7'	+20.2'	101.7°	44°45.0'	+21.6'	102.6°	44°31.4'	+22.9'	103.6°	44°16.8'	+24.2'	104.6°	4
5	45°45.5'	+15.0'	97.3°	45°37.3'	+16.4'	98.3°	45°28.1'	+17.9'	99.3°	45°17.9'	+19.3'	100.3°	45°06.6'	+20.6'	101.3°	44°54.3'	+22.0'	102.3°	44°41.0'	+23.3'	103.3°	5
6	46°00.5'	+14.0'	95.9°	45°53.8'	+15.4'	96.9°	45°46.0'	+16.9'	98.0°	45°37.1'	+18.3'	99.0°	45°27.2'	+19.7'	100.0°	45°16.3'	+21.1'	101.0°	45°04.4'	+22.4'	102.0°	6
7	46°14.4'	+12.9'	94.5°	46°09.2'	+14.4'	95.6°	46°02.8'	+15.9'	96.6°	45°55.4'	+17.3'	97.6°	45°46.9'	+18.7'	98.6°	45°37.4'	+20.1'	99.6°	45°26.8'	+21.5'	100.7°	7
8	46°27.4'	+11.9'	93.1°	46°23.6'	+13.4'	94.2°	46°18.7'	+14.8'	95.2°	46°12.7'	+16.3'	96.2°	46°05.7'	+17.7'	97.3°	45°57.5'	+19.2'	98.3°	45°48.3'	+20.6'	99.3°	8
9	46°39.3'	+10.8'	91.7°	46°36.9'	+12.3'	92.7°	46°33.5'	+13.8'	93.8°	46°29.0'	+15.3'	94.8°	46°23.4'	+16.7'	95.9°	46°16.7'	+18.2'	96.9°	46°08.9'	+19.6'	98.0°	9
10	46°50.1'	+9.7'	90.2°	46°49.2'	+11.2'	91.3°	46°47.3'	+12.7'	92.4°	46°44.3'	+14.2'	93.4°	46°40.1'	+15.7'	94.5°	46°34.9'	+17.2'	95.5°	46°28.5'	+18.6'	96.6°	10
11	46°59.8'	+8.6'	88.8°	47°00.5'	+10.1'	89.9°	47°00.0'	+11.7'	90.9°	46°58.5'	+13.2'	92.0°	46°55.8'	+14.7'	93.1°	46°52.0'	+16.1'	94.2°	46°47.2'	+17.6'	95.2°	11
12	47°08.4'	+7.5'	87.3°	47°10.6'	+9.0'	88.4°	47°11.7'	+10.6'	89.5°	47°11.7'	+12.1'	90.6°	47°10.5'	+13.6'	91.7°	47°08.2'	+15.1'	92.7°	47°04.8'	+16.6'	93.8°	12
13	47°15.9'	+6.4'	85.9°	47°19.7'	+7.9'	87.0°	47°22.3'	+9.5'	88.1°	47°23.7'	+11.0'	89.1°	47°24.1'	+12.5'	90.2°	47°23.3'	+14.0'	91.3°	47°21.3'	+15.5'	92.4°	13
14	47°22.3'	+5.3'	84.4°	47°27.6'	+6.8'	85.5°	47°31.7'	+8.3'	86.6°	47°34.7'	+9.9'	87.7°	47°36.6'	+11.4'	88.8°	47°37.3'	+12.9'	89.9°	47°36.8'	+14.4'	91.0°	14
15	47°27.6'	+4.1'	82.9°	47°34.4'	+5.7'	84.0°	47°40.1'	+7.2'	85.1°	47°44.6'	+8.7'	86.2°	47°48.0'	+10.3'	87.3°	47°50.2'	+11.8'	88.4°	47°51.3'	+13.3'	89.5°	15
16	47°31.7'	+3.0'	81.5°	47°40.1'	+4.5'	82.6°	47°47.3'	+6.1'	83.6°	47°53.3'	+7.6'	84.7°	47°58.3'	+9.2'	85.8°	48°02.0'	+10.7'	87.0°	48°04.6'	+12.2'	88.1°	16
17	47°34.7'	+1.9'	80.0°	47°44.6'	+3.4'	81.1°	47°53.3'	+4.9'	82.2°	48°01.0'	+6.5'	83.3°	48°07.4'	+8.0'	84.4°	48°12.7'	+9.6'	85.5°	48°16.9'	+11.1'	86.6°	17
18	47°36.6'	+0.7'	78.5°	47°48.0'	+2.2'	79.6°	47°58.3'	+3.8'	80.7°	48°07.4'	+5.3'	81.8°	48°15.4'	+6.9'	82.9°	48°22.3'	+8.4'	84.0°	48°28.0'	+10.0'	85.1°	18
19	47°37.3'	-0.4'	77.0°	47°50.2'	+0.1'	78.1°	48°02.0'	+2.6'	79.2°	48°12.7'	+4.1'	80.3°	48°22.3'	+5.7'	81.4°	48°30.7'	+7.2'	82.5°	48°37.9'	+8.8'	83.6°	19
20	47°36.8'	-0.1'	75.5°	47°51.3'	-0.1'	76.6°	48°04.6'	+0.1'	77.7°	48°16.9'	+3.0'	78.8°	48°28.0'	+4.5'	79.9°	48°37.9'	+6.1'	81.0°	48°46.7'	+7.6'	82.1°	20
21	47°35.3'	-0.2'	74.1°	47°51.2'	-0.1'	75.1°	48°06.1'	+0.3'	76.2°	48°19.8'	+0.1'	77.3°	48°32.5'	+3.3'	78.4°	48°44.0'	+4.9'	79.5°	48°54.4'	+6.4'	80.6°	21
22	47°32.5'	-0.9'	72.6°	47°50.0'	-0.2'	73.6°	48°06.3'	-0.0'	74.7°	48°21.6'	+0.6'	75.8°	48°35.8'	+2.1'	76.9°	48°48.9'	+3.7'	78.0°	49°00.8'	+5.2'	79.1°	22
23	47°28.7'	-0.5'	71.1°	47°47.6'	-0.3'	72.1°	48°05.5'	-0.2'	73.2°	48°22.3'	-0.0'	74.3°	48°38.0'	+0.1'	75.4°	48°52.6'	+2.5'	76.5°	49°06.0'	+4.0'	77.6°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

44° 316° LHA

Latitude SAME as Declination

44° 316° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

45° 315° LHA

Latitude SAME as Declination

45° 315° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	43°19.3'	+19.5'	103.6°	43°04.8'	+20.8'	104.5°	42°49.3'	+22.1'	105.4°	42°32.9'	+23.4'	106.3°	42°15.6'	+24.7'	107.2°	41°57.5'	+25.9'	108.0°	41°38.5'	+27.1'	108.9°	0
1	43°38.9'	+18.6'	102.3°	43°25.6'	+20.0'	103.2°	43°11.4'	+21.3'	104.1°	42°56.3'	+22.6'	105.0°	42°40.3'	+23.8'	105.9°	42°23.3'	+25.1'	106.8°	42°05.6'	+26.3'	107.7°	1
2	43°57.5'	+17.7'	101.0°	43°45.6'	+19.1'	101.9°	43°32.7'	+20.4'	102.9°	43°18.9'	+21.7'	103.8°	43°04.1'	+23.0'	104.7°	42°48.5'	+24.3'	105.6°	42°31.9'	+25.5'	106.5°	2
3	44°15.2'	+16.8'	99.6°	44°04.6'	+18.1'	100.6°	43°53.1'	+19.5'	101.6°	43°40.6'	+20.8'	102.5°	43°27.1'	+22.2'	103.4°	43°12.7'	+23.5'	104.3°	42°57.4'	+24.7'	105.2°	3
4	44°31.9'	+15.8'	98.3°	44°22.7'	+17.2'	99.3°	44°12.6'	+18.6'	100.2°	44°01.4'	+19.9'	101.2°	43°49.3'	+21.3'	102.1°	43°36.2'	+22.6'	103.1°	43°22.2'	+23.9'	104.0°	4
5	44°47.7'	+14.8'	96.9°	44°40.0'	+16.2'	97.9°	44°31.2'	+17.7'	98.9°	44°21.4'	+19.0'	99.9°	44°10.6'	+20.4'	100.8°	43°58.8'	+21.7'	101.8°	43°46.1'	+23.1'	102.7°	5
6	45°02.6'	+13.8'	95.6°	44°56.2'	+15.3'	96.6°	44°48.8'	+16.7'	97.6°	44°40.4'	+18.1'	98.5°	44°31.0'	+19.5'	99.5°	44°20.6'	+20.9'	100.5°	44°09.2'	+22.2'	101.4°	6
7	45°16.4'	+12.8'	94.2°	45°11.5'	+14.3'	95.2°	45°05.5'	+15.7'	96.2°	44°58.5'	+17.1'	97.2°	44°50.5'	+18.5'	98.2°	44°41.4'	+19.9'	99.2°	44°31.4'	+21.3'	100.1°	7
8	45°29.2'	+11.8'	92.8°	45°25.8'	+13.3'	93.8°	45°21.2'	+14.7'	94.8°	45°15.7'	+16.2'	95.8°	45°09.0'	+17.6'	96.8°	45°01.4'	+19.0'	97.8°	44°52.7'	+20.4'	98.8°	8
9	45°41.1'	+10.8'	91.4°	45°39.0'	+12.3'	92.4°	45°36.0'	+13.7'	93.5°	45°31.8'	+15.2'	94.5°	45°26.6'	+16.6'	95.5°	45°20.4'	+18.0'	96.5°	45°13.1'	+19.4'	97.5°	9
10	45°51.8'	+9.7'	90.0°	45°51.3'	+11.2'	91.0°	45°49.7'	+12.7'	92.1°	45°47.0'	+14.2'	93.1°	45°43.2'	+15.6'	94.1°	45°38.4'	+17.1'	95.1°	45°32.5'	+18.5'	96.1°	10
11	46°01.6'	+8.6'	88.6°	46°02.5'	+10.2'	89.6°	46°02.4'	+11.7'	90.7°	46°01.2'	+13.1'	91.7°	45°58.8'	+14.6'	92.7°	45°55.5'	+16.1'	93.8°	45°51.0'	+17.5'	94.8°	11
12	46°10.3'	+7.6'	87.2°	46°12.7'	+9.1'	88.2°	46°14.0'	+10.6'	89.2°	46°14.3'	+12.1'	90.3°	46°13.4'	+13.6'	91.3°	46°11.5'	+15.0'	92.4°	46°08.5'	+16.5'	93.4°	12
13	46°17.9'	+6.5'	85.7°	46°21.8'	+8.0'	86.8°	46°24.6'	+9.5'	87.8°	46°26.4'	+11.0'	88.9°	46°27.0'	+12.5'	89.9°	46°26.6'	+14.0'	91.0°	46°25.0'	+15.5'	92.0°	13
14	46°24.4'	+5.4'	84.3°	46°29.8'	+6.9'	85.3°	46°34.2'	+8.4'	86.4°	46°37.4'	+9.9'	87.4°	46°39.5'	+11.5'	88.5°	46°40.6'	+13.0'	89.6°	46°40.5'	+14.4'	90.6°	14
15	46°29.8'	+4.3'	82.8°	46°36.8'	+5.8'	83.9°	46°42.6'	+7.4'	84.9°	46°47.4'	+8.9'	86.0°	46°51.0'	+10.4'	87.1°	46°53.5'	+11.9'	88.1°	46°54.9'	+13.4'	89.2°	15
16	46°34.2'	+3.2'	81.4°	46°42.6'	+4.7'	82.4°	46°50.0'	+6.3'	83.5°	46°56.2'	+7.8'	84.5°	47°01.4'	+9.3'	85.6°	47°05.4'	+10.8'	86.7°	47°08.3'	+12.3'	87.8°	16
17	46°37.4'	+2.1'	79.9°	46°47.4'	+3.6'	81.0°	46°56.2'	+5.1'	82.0°	47°04.0'	+6.7'	83.1°	47°10.6'	+8.2'	84.2°	47°16.2'	+9.7'	85.2°	47°20.6'	+11.2'	86.3°	17
18	46°39.5'	+1.0'	78.5°	46°51.0'	+2.5'	79.5°	47°01.4'	+4.0'	80.6°	47°10.6'	+5.5'	81.6°	47°18.8'	+7.1'	82.7°	47°25.9'	+8.6'	83.8°	47°31.8'	+10.1'	84.9°	18
19	46°40.6'	-0.1'	77.0°	46°53.5'	+0.1'	78.1°	47°05.4'	+2.9'	79.1°	47°16.2'	+4.4'	80.2°	47°25.9'	+5.9'	81.2°	47°34.5'	+7.5'	82.3°	47°41.9'	+9.0'	83.4°	19
20	46°40.5'	-0.1'	75.6°	46°54.9'	+0.3'	76.6°	47°08.3'	+0.1'	77.6°	47°20.6'	+3.3'	78.7°	47°31.8'	+4.8'	79.8°	47°41.9'	+6.3'	80.8°	47°50.9'	+7.8'	81.9°	20
21	46°39.3'	-0.2'	74.1°	46°55.2'	-0.0'	75.1°	47°10.1'	+0.6'	76.2°	47°23.9'	+2.1'	77.2°	47°36.6'	+3.7'	78.3°	47°48.2'	+5.2'	79.4°	47°58.7'	+6.7'	80.5°	21
22	46°37.0'	-0.3'	72.6°	46°54.4'																		

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

46° 314° LHA

Latitude SAME as Declination

46° 314° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	42°22.7'	+19.2'	103.1°	42°08.6'	+20.5'	104.0°	41°53.6'	+21.8'	104.9°	41°37.7'	+23.1'	105.8°	41°21.0'	+24.3'	106.6°	41°03.4'	+25.5'	107.5°	40°45.0'	+26.7'	108.3°	0
1	42°41.9'	+18.3'	101.9°	42°29.1'	+19.7'	102.8°	42°15.4'	+21.0'	103.7°	42°00.8'	+22.3'	104.5°	41°45.3'	+23.5'	105.4°	41°29.0'	+24.8'	106.2°	41°11.8'	+26.0'	107.1°	1
2	43°00.3'	+17.5'	100.6°	42°48.8'	+18.8'	101.5°	42°36.4'	+20.1'	102.4°	42°23.1'	+21.4'	103.3°	42°08.8'	+22.7'	104.2°	41°53.7'	+24.0'	105.0°	41°37.7'	+25.2'	105.9°	2
3	43°17.7'	+16.6'	99.3°	43°07.6'	+17.9'	100.2°	42°56.5'	+19.3'	101.1°	42°44.5'	+20.6'	102.0°	42°31.6'	+21.9'	102.9°	42°17.7'	+23.2'	103.8°	42°03.0'	+24.4'	104.7°	3
4	43°34.3'	+15.6'	97.9°	43°25.5'	+17.0'	98.9°	43°15.8'	+18.4'	99.8°	43°05.1'	+19.7'	100.7°	42°53.5'	+21.0'	101.6°	42°40.9'	+22.4'	102.5°	42°27.4'	+23.6'	103.4°	4
5	43°49.9'	+14.7'	96.6°	43°42.5'	+16.1'	97.5°	43°34.2'	+17.5'	98.5°	43°24.8'	+18.8'	99.4°	43°14.5'	+20.2'	100.4°	43°03.2'	+21.5'	101.3°	42°51.0'	+22.8'	102.2°	5
6	44°04.6'	+13.7'	95.2°	43°58.6'	+15.1'	96.2°	43°51.6'	+16.5'	97.2°	43°43.6'	+17.9'	98.1°	43°34.7'	+19.3'	99.1°	43°24.7'	+20.6'	100.0°	43°13.9'	+22.0'	100.9°	6
7	44°18.3'	+12.8'	93.9°	44°13.7'	+14.2'	94.9°	44°08.2'	+15.6'	95.8°	44°01.6'	+17.0'	96.8°	43°54.0'	+18.4'	97.7°	43°45.4'	+19.7'	98.7°	43°35.8'	+21.1'	99.6°	7
8	44°31.1'	+11.8'	92.5°	44°27.9'	+13.2'	93.5°	44°23.7'	+14.6'	94.5°	44°18.6'	+16.0'	95.5°	44°12.3'	+17.5'	96.4°	44°05.1'	+18.8'	97.4°	43°56.9'	+20.2'	98.3°	8
9	44°42.9'	+10.8'	91.1°	44°41.1'	+12.2'	92.1°	44°38.4'	+13.7'	93.1°	44°34.6'	+15.1'	94.1°	44°29.8'	+16.5'	95.1°	44°24.0'	+17.9'	96.1°	44°17.1'	+19.3'	97.0°	9
10	44°53.6'	+09.8'	89.8°	44°53.4'	+11.2'	90.8°	44°52.0'	+12.7'	91.7°	44°49.7'	+14.1'	92.7°	44°46.3'	+15.5'	93.7°	44°41.9'	+17.0'	94.7°	44°36.4'	+18.4'	95.7°	10
11	45°03.4'	+08.7'	88.4°	45°04.6'	+10.2'	89.4°	45°04.7'	+11.7'	90.4°	45°03.8'	+13.1'	91.4°	45°01.8'	+14.6'	92.4°	44°58.8'	+16.0'	93.4°	44°54.8'	+17.4'	94.4°	11
12	45°12.1'	+07.7'	87.0°	45°14.8'	+09.2'	88.0°	45°16.4'	+10.6'	89.0°	45°16.9'	+12.1'	90.0°	45°16.4'	+13.6'	91.0°	45°14.8'	+15.0'	92.0°	45°12.2'	+16.4'	93.0°	12
13	45°19.8'	+06.7'	85.6°	45°23.9'	+08.1'	86.6°	45°27.0'	+09.6'	87.6°	45°29.0'	+11.1'	88.6°	45°30.0'	+12.5'	89.6°	45°29.8'	+14.0'	90.6°	45°28.6'	+15.5'	91.6°	13
14	45°26.5'	+05.6'	84.1°	45°32.1'	+07.1'	85.1°	45°36.6'	+08.6'	86.2°	45°40.1'	+10.0'	87.2°	45°42.5'	+11.5'	88.2°	45°43.8'	+13.0'	89.2°	45°44.1'	+14.4'	90.3°	14
15	45°32.1'	+04.5'	82.7°	45°39.1'	+06.0'	83.7°	45°45.2'	+07.5'	84.8°	45°50.1'	+09.0'	85.8°	45°54.0'	+10.5'	86.8°	45°56.8'	+11.9'	87.8°	45°58.5'	+13.4'	88.9°	15
16	45°36.6'	+03.5'	81.3°	45°45.2'	+05.0'	82.3°	45°52.7'	+06.4'	83.3°	45°59.1'	+07.9'	84.4°	46°04.5'	+09.4'	85.4°	46°08.8'	+10.9'	86.4°	46°12.0'	+12.4'	87.5°	16
17	45°40.1'	+02.4'	79.9°	45°50.1'	+03.9'	80.9°	45°59.1'	+05.4'	81.9°	46°07.0'	+06.9'	82.9°	46°13.9'	+08.3'	84.0°	46°19.7'	+09.8'	85.0°	46°24.3'	+11.3'	86.0°	17
18	45°42.5'	+01.3'	78.4°	45°54.0'	+02.8'	79.4°	46°04.5'	+04.3'	80.5°	46°13.9'	+05.8'	81.5°	46°22.2'	+07.3'	82.5°	46°29.5'	+08.8'	83.6°	46°35.7'	+10.3'	84.6°	18
19	45°43.8'	+00.3'	77.0°	45°56.8'	+01.7'	78.0°	46°08.8'	+03.2'	79.0°	46°19.7'	+04.7'	80.1°	46°29.5'	+06.2'	81.1°	46°38.2'	+07.7'	82.1°	46°45.9'	+09.2'	83.2°	19
20	45°44.1'	-00.8'	75.6°	45°58.5'	+00.6'	76.6°	46°12.0'	+02.1'	77.6°	46°24.3'	+03.6'	78.6°	46°35.7'	+05.1'	79.6°	46°45.9'	+06.6'	80.7°	46°55.1'	+08.1'	81.7°	20
21	45°43.3'	-01.9'	74.1°	45°59.2'	-00.4'	75.1°	46°14.1'	+01.0'	76.1°	46°27.9'	+02.5'	77.2°	46°40.7'	+04.0'	78.2°	46°52.5'	+05.5'	79.2°	47°03.1'	+07.0'	80.3°	21
22	45°41.4'	-03.0'	72.7°	45°58.7'	-01.5'	73.7°	46°15.1'	-00.1'	74.7°	46°30.4'	+01.4'	75.7°	46°44.7'	+02.9'	76.7°	46°57.9'	+04.3'	77.8°	47°10.1'	+05.8'	78.8°	22
23	45°38.4'	-04.0'	71.3°	45°57.2'	-02.6'	72.3°	46°15.0'	-01.2'	73.2°	46°31.8'	+00.3'	74.3°	46°47.6'	+01.7'	75.3°	47°02.3'	+03.2'	76.3°	47°16.0'	+04.7'	77.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

46° 314° LHA

Latitude SAME as Declination

46° 314° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

47° 313° LHA

Latitude SAME as Declination

47° 313° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	41°26.0'	+18.9'	102.7°	41°12.3'	+20.2'	103.6°	40°57.8'	+21.5'	104.4°	40°42.5'	+22.8'	105.3°	40°26.3'	+24.0'	106.1°	40°09.2'	+25.2'	106.9°	39°51.4'	+26.4'	107.7°	0
1	41°44.9'	+18.1'	101.4°	41°32.6'	+19.4'	102.3°	41°19.3'	+20.7'	103.2°	41°05.2'	+22.0'	104.0°	40°50.2'	+23.2'	104.9°	40°34.4'	+24.4'	105.7°	40°17.8'	+25.7'	106.5°	1
2	42°03.0'	+17.2'	100.2°	41°52.0'	+18.6'	101.0°	41°40.0'	+19.9'	101.9°	41°27.2'	+21.2'	102.8°	41°13.5'	+22.4'	103.6°	40°58.9'	+23.7'	104.5°	40°43.4'	+24.9'	105.3°	2
3	42°20.2'	+16.4'	98.9°	42°10.5'	+17.7'	99.8°	41°59.9'	+19.0'	100.7°	41°48.3'	+20.3'	101.5°	41°35.9'	+21.6'	102.4°	41°22.6'	+22.9'	103.3°	41°08.4'	+24.2'	104.1°	3
4	42°36.6'	+15.5'	97.6°	42°28.2'	+16.8'	98.5°	42°18.9'	+18.2'	99.4°	42°08.7'	+19.5'	100.3°	41°57.5'	+20.8'	101.2°	41°45.5'	+22.1'	102.0°	41°32.5'	+23.4'	102.9°	4
5	42°52.1'	+14.5'	96.3°	42°45.0'	+15.9'	97.2°	42°37.1'	+17.3'	98.1°	42°28.2'	+18.6'	99.0°	42°18.3'	+20.0'	99.9°	42°07.6'	+21.3'	100.8°	41°55.9'	+22.6'	101.7°	5
6	43°06.6'	+13.6'	94.9°	43°01.0'	+15.0'	95.9°	42°54.4'	+16.4'	96.8°	42°46.8'	+17.8'	97.7°	42°38.3'	+19.1'	98.6°	42°28.8'	+20.4'	99.5°	42°18.4'	+21.7'	100.4°	6
7	43°20.2'	+12.7'	93.6°	43°12.0'	+14.1'	94.5°	43°10.8'	+15.5'	95.5°	43°04.6'	+16.9'	96.4°	42°57.4'	+18.2'	97.3°	42°49.3'	+19.6'	98.2°	42°40.2'	+20.9'	99.2°	7
8	43°32.9'	+11.7'	92.2°	43°30.1'	+13.1'	93.2°	43°26.2'	+14.5'	94.1°	43°21.4'	+15.9'	95.1°	43°15.6'	+17.3'	96.0°	43°08.8'	+18.7'	97.0°	43°01.1'	+20.0'	97.9°	8
9	43°44.6'	+10.8'	90.9°	43°43.2'	+12.2'	91.8°	43°40.8'	+13.6'	92.8°	43°37.4'	+15.0'	93.7°	43°32.9'	+16.4'	94.7°	43°27.5'	+17.8'	95.6°	43°21.1'	+19.2'	96.6°	9
10	43°55.4'	+09.8'	89.5°	43°55.4'	+11.2'	90.5°	43°54.4'	+12.6'	91.4°	43°52.4'	+14.1'	92.4°	43°49.3'	+15.5'	93.4°	43°45.3'	+16.9'	94.3°	43°40.3'	+18.3'	95.3°	10
11	44°05.2'	+08.8'	88.2°	44°06.6'	+10.2'	89.1°	44°07.0'	+11.7'	90.1°	44°06.4'	+13.1'	91.1°	44°04.8'	+14.5'	92.0°	44°02.2'	+15.9'	93.0°	43°58.5'	+17.3'	94.0°	11
12	44°14.0'	+07.8'	86.8°	44°16.9'	+09.2'	87.7°	44°18.7'	+10.7'	88.7°	44°19.5'	+12.1'	89.7°	44°19.3'	+13.6'	90.7°	44°18.1'	+15.0'	91.6°	44°15.9'	+16.4'	92.6°	12
13	44°21.8'	+06.8'	85.4°	44°26.1'	+08.2'	86.4°	44°29.4'	+09.7'	87.3°	44°31.7'	+11.1'	88.3°	44°32.9'	+12.6'	89.3°	44°33.1'	+14.0'	90.3°	44°32.3'	+15.4'	91.3°	13
14	44°28.6'	+05.8'	84.0°	44°34.3'	+07.2'	85.0°	44°39.1'	+08.7'	86.0°	44°42.8'	+10.1'	86.9°	44°45.5'	+11.6'	87.9°	44°47.1'	+13.0'	88.9°	44°47.7'	+14.5'	89.9°	14
15	44°34.3'	+04.7'	82.6°	44°41.5'	+06.2'	83.6°	44°47.7'	+07.7'	84.6°	44°52.9'	+09.1'	85.6°	44°57.0'	+10.6'	86.6°	45°00.1'	+12.0'	87.5°	45°02.2'	+13.5'	88.5°	15
16	44°39.1'	+03.7'	81.2°	44°47.7'	+05.2'	82.2°	44°55.4'	+06.6'	83.2°	45°02.0'	+08.1'	84.2°	45°07.6'	+09.5'	85.2°	45°12.1'	+11.0'	86.2°	45°15.6'	+12.5'	87.2°	16
17	44°42.8'	+02.7'	79.8°	44°52.9'	+04.1'	80.8°	45°02.0'	+05.6'	81.8°	45°10.1'	+07.0'	82.8°	45°17.1'	+08.5'	83.8°	45°23.2'	+10.0'	84.8°	45°28.1'	+11.4'	85.8°	17
18	44°45.5'	+01.6'	78.4°	44°57.0'	+03.1'	79.4°	45°07.6'	+04.5'	80.4°	45°17.1'	+06.0'	81.3°	45°25.7'	+07.5'	82.3°	45°33.1'	+08.9'	83.4°	45°39.5'	+10.4'	84.4°	18
19	44°47.1'	+00.6'	77.0°	45°00.1'	+02.0'	78.0°	45°12.1'	+03.5'	78.9°	45°23.2'	+04.9'	79.9°	45°33.1'	+06.4'	80.9°	45°42.1'	+07.9'	81.9°	45°49.9'	+09.4'	83.0°	19
20	44°47.7'	-00.4'	75.6°	45°02.2'	+01.0'	76.5°	45°15.6'	+02.4'	77.5°	45°28.1'	+03.9'	78.5°	45°39.5'	+05.4'	79.5°	45°49.9'	+06.8'	80.5°	45°59.3'	+08.3'	81.5°	20
21	44°47.3'	-01.5'	74.2°	45°03.2'	-00.1'	75.1°	45°18.1'	+01.4'	76.1°	45°32.0'	+02.8'	77.1°	45°44.9'	+04.3'	78.1°	45°56.8'						

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

48° 312° LHA

Latitude SAME as Declination

48° 312° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	40°29.1'	+18.7'	102.3°	40°15.9'	+20.0'	103.1°	40°01.9'	+21.2'	103.9°	39°47.0'	+22.5'	104.7°	39°31.3'	+23.7'	105.5°	39°14.9'	+24.9'	106.3°	38°57.6'	+26.0'	107.1°	0
1	40°47.8'	+17.9'	101.0°	40°35.9'	+19.2'	101.9°	40°23.1'	+20.4'	102.7°	40°09.5'	+21.7'	103.5°	39°55.0'	+22.9'	104.4°	39°39.7'	+24.1'	105.2°	39°23.6'	+25.3'	106.0°	1
2	41°05.7'	+17.0'	99.8°	40°55.0'	+18.3'	100.6°	40°43.5'	+19.6'	101.5°	40°31.2'	+20.9'	102.3°	40°17.9'	+22.2'	103.1°	40°03.9'	+23.4'	104.0°	39°49.0'	+24.6'	104.8°	2
3	41°22.7'	+16.2'	98.5°	41°13.4'	+17.5'	99.4°	41°03.2'	+18.8'	100.2°	40°52.1'	+20.1'	101.1°	40°40.1'	+21.4'	101.9°	40°27.3'	+22.6'	102.8°	40°13.6'	+23.9'	103.6°	3
4	41°38.9'	+15.3'	97.2°	41°30.9'	+16.6'	98.1°	41°22.0'	+18.0'	99.0°	41°12.2'	+19.3'	99.8°	41°01.5'	+20.6'	100.7°	40°49.9'	+21.9'	101.5°	40°37.5'	+23.1'	102.4°	4
5	41°54.2'	+14.4'	95.9°	41°47.5'	+15.8'	96.8°	41°40.0'	+17.1'	97.7°	41°31.5'	+18.5'	98.6°	41°22.1'	+19.8'	99.4°	41°11.8'	+21.1'	100.3°	41°00.6'	+22.3'	101.2°	5
6	42°08.6'	+13.5'	94.6°	42°03.3'	+14.9'	95.5°	41°57.1'	+16.3'	96.4°	41°49.9'	+17.6'	97.3°	41°41.8'	+18.9'	98.2°	41°32.8'	+20.2'	99.1°	41°23.0'	+21.5'	99.9°	6
7	42°22.1'	+12.6'	93.3°	42°18.2'	+14.0'	94.2°	42°13.3'	+15.4'	95.1°	42°07.5'	+16.7'	96.0°	42°00.8'	+18.1'	96.9°	41°53.1'	+19.4'	97.8°	41°44.5'	+20.7'	98.7°	7
8	42°34.7'	+11.7'	92.0°	42°32.2'	+13.1'	92.9°	42°28.7'	+14.5'	93.8°	42°24.2'	+15.8'	94.7°	42°18.8'	+17.2'	95.6°	42°12.5'	+18.6'	96.5°	42°05.2'	+19.9'	97.4°	8
9	42°46.4'	+10.8'	90.6°	42°45.3'	+12.2'	91.6°	42°43.2'	+13.6'	92.5°	42°40.1'	+14.9'	93.4°	42°36.1'	+16.3'	94.3°	42°31.1'	+17.7'	95.2°	42°25.1'	+19.0'	96.1°	9
10	42°57.2'	+09.8'	89.3°	42°57.4'	+11.2'	90.2°	42°56.7'	+12.6'	91.2°	42°55.0'	+14.0'	92.1°	42°52.4'	+15.4'	93.0°	42°48.7'	+16.8'	93.9°	42°44.1'	+18.2'	94.9°	10
11	43°07.0'	+08.9'	87.9°	43°08.7'	+10.3'	88.9°	43°09.4'	+11.7'	89.8°	43°09.1'	+13.1'	90.8°	43°07.8'	+14.5'	91.7°	43°05.5'	+15.9'	92.6°	43°02.3'	+17.3'	93.6°	11
12	43°15.9'	+07.9'	86.6°	43°18.9'	+09.3'	87.5°	43°21.0'	+10.7'	88.5°	43°22.2'	+12.1'	89.4°	43°22.3'	+13.6'	90.4°	43°21.4'	+15.0'	91.3°	43°19.6'	+16.4'	92.2°	12
13	43°23.8'	+06.9'	85.2°	43°28.3'	+08.3'	86.2°	43°31.8'	+09.8'	87.1°	43°34.3'	+11.2'	88.1°	43°35.8'	+12.6'	89.0°	43°36.4'	+14.0'	90.0°	43°35.9'	+15.4'	90.9°	13
14	43°30.7'	+05.9'	83.9°	43°36.6'	+07.4'	84.8°	43°41.5'	+08.8'	85.7°	43°45.5'	+10.2'	86.7°	43°48.4'	+11.6'	87.7°	43°50.4'	+13.1'	88.6°	43°51.3'	+14.5'	89.6°	14
15	43°36.6'	+04.9'	82.5°	43°44.0'	+06.4'	83.4°	43°50.3'	+07.8'	84.4°	43°55.7'	+09.2'	85.3°	44°00.1'	+10.7'	86.3°	44°03.5'	+12.1'	87.3°	44°05.8'	+13.5'	88.2°	15
16	43°41.5'	+03.9'	81.1°	43°50.3'	+05.4'	82.0°	43°58.1'	+06.8'	83.0°	44°04.9'	+08.2'	84.0°	44°10.8'	+09.7'	84.9°	44°15.6'	+11.1'	85.9°	44°19.3'	+12.5'	86.9°	16
17	43°45.5'	+02.9'	79.7°	43°55.7'	+04.4'	80.7°	44°04.9'	+05.8'	81.6°	44°13.2'	+07.2'	82.6°	44°20.4'	+08.7'	83.6°	44°26.7'	+10.1'	84.5°	44°31.9'	+11.6'	85.5°	17
18	43°48.4'	+01.9'	78.3°	44°00.1'	+03.4'	79.3°	44°10.8'	+04.8'	80.2°	44°20.4'	+06.2'	81.2°	44°29.1'	+07.7'	82.2°	44°36.8'	+09.1'	83.1°	44°43.4'	+10.6'	84.1°	18
19	43°50.4'	+00.9'	77.0°	44°03.5'	+02.4'	77.9°	44°15.6'	+03.8'	78.8°	44°26.7'	+05.2'	79.8°	44°36.8'	+06.7'	80.8°	44°45.9'	+08.1'	81.8°	44°54.0'	+09.5'	82.7°	19
20	43°51.3'	-00.1'	75.6°	44°05.8'	+01.3'	76.5°	44°19.3'	+02.8'	77.4°	44°31.9'	+04.2'	78.4°	44°43.4'	+05.6'	79.4°	44°54.0'	+07.1'	80.4°	45°03.5'	+08.5'	81.3°	20
21	43°51.3'	-01.1'	74.2°	44°07.2'	+00.3'	75.1°	44°22.1'	+01.7'	76.1°	44°36.1'	+03.2'	77.0°	44°49.1'	+04.6'	78.0°	45°01.1'	+06.0'	79.0°	45°12.1'	+07.5'	79.9°	21
22	43°50.2'	-02.1'	72.8°	44°07.5'	-00.7'	73.7°	44°23.8'	+00.7'	74.7°	44°39.2'	+02.1'	75.6°	44°53.7'	+03.6'	76.6°	45°07.1'	+05.0'	77.5°	45°19.5'	+06.4'	78.5°	22
23	43°48.1'	-03.1'	71.4°	44°06.8'	-01.7'	72.3°	44°24.6'	-00.3'	73.3°	44°41.4'	+01.1'	74.2°	44°57.2'	+02.5'	75.2°	45°12.1'	+03.9'	76.1°	45°26.0'	+05.4'	77.1°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

48° 312° LHA

Latitude SAME as Declination

48° 312° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

49° 311° LHA

Latitude SAME as Declination

49° 311° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	39°32.2'	+18.4'	101.9°	39°19.4'	+19.7'	102.7°	39°05.9'	+20.9'	103.5°	38°51.5'	+22.2'	104.3°	38°36.3'	+23.4'	105.0°	38°20.4'	+24.6'	105.8°	38°03.6'	+25.7'	106.6°	0
1	39°50.6'	+17.6'	100.6°	39°39.1'	+18.9'	101.5°	39°26.8'	+20.2'	102.3°	39°13.6'	+21.4'	103.1°	38°59.7'	+22.6'	103.9°	38°44.9'	+23.9'	104.6°	38°29.4'	+25.0'	105.4°	1
2	40°08.3'	+16.8'	99.4°	39°58.0'	+18.1'	100.2°	39°47.0'	+19.4'	101.0°	39°35.1'	+20.7'	101.9°	39°22.3'	+21.9'	102.7°	39°08.8'	+23.1'	103.5°	38°54.4'	+24.3'	104.2°	2
3	40°25.1'	+16.0'	98.1°	40°16.2'	+17.3'	99.0°	40°06.4'	+18.6'	99.8°	39°55.7'	+19.9'	100.6°	39°44.2'	+21.1'	101.5°	39°31.9'	+22.4'	102.3°	39°18.7'	+23.6'	103.1°	3
4	40°41.1'	+15.2'	96.9°	40°33.5'	+16.5'	97.7°	40°25.0'	+17.8'	98.6°	40°15.6'	+19.1'	99.4°	40°05.4'	+20.4'	100.2°	39°54.3'	+21.6'	101.1°	39°42.4'	+22.9'	101.9°	4
5	40°56.2'	+14.3'	95.6°	40°50.0'	+15.6'	96.4°	40°42.8'	+17.0'	97.3°	40°34.7'	+18.3'	98.2°	40°25.8'	+19.6'	99.0°	40°15.9'	+20.9'	99.8°	40°05.3'	+22.1'	100.7°	5
6	41°10.5'	+13.4'	94.3°	41°05.6'	+14.8'	95.2°	40°59.7'	+16.1'	96.0°	40°53.0'	+17.5'	96.9°	40°45.3'	+18.8'	97.8°	40°36.8'	+20.1'	98.6°	40°27.4'	+21.3'	99.5°	6
7	41°24.0'	+12.6'	93.0°	41°20.4'	+13.9'	93.9°	41°15.9'	+15.3'	94.8°	41°10.4'	+16.6'	95.6°	41°04.1'	+17.9'	96.5°	40°56.9'	+19.3'	97.4°	40°48.7'	+20.6'	98.2°	7
8	41°36.5'	+11.7'	91.7°	41°34.3'	+13.0'	92.6°	41°31.1'	+14.4'	93.5°	41°27.0'	+15.8'	94.4°	41°22.0'	+17.1'	95.2°	41°16.1'	+18.4'	96.1°	41°09.3'	+19.7'	97.0°	8
9	41°48.2'	+10.8'	90.4°	41°47.3'	+12.1'	91.3°	41°45.5'	+13.5'	92.2°	41°42.8'	+14.9'	93.1°	41°39.1'	+16.2'	93.9°	41°34.5'	+17.6'	94.8°	41°29.0'	+18.9'	95.7°	9
10	41°59.0'	+09.8'	89.1°	41°59.5'	+11.2'	90.0°	41°59.1'	+12.6'	90.9°	41°57.7'	+14.0'	91.8°	41°55.4'	+15.4'	92.7°	41°52.1'	+16.7'	93.6°	41°47.9'	+18.1'	94.4°	10
11	42°08.8'	+08.9'	87.7°	42°10.7'	+10.3'	88.6°	42°11.7'	+11.7'	89.5°	42°11.7'	+13.1'	90.4°	42°10.7'	+14.5'	91.4°	42°08.8'	+15.8'	92.3°	42°06.0'	+17.2'	93.2°	11
12	42°17.8'	+08.0'	86.4°	42°21.0'	+09.4'	87.3°	42°23.4'	+10.8'	88.2°	42°24.8'	+12.2'	89.1°	42°25.2'	+13.6'	90.0°	42°24.7'	+14.9'	91.0°	42°23.2'	+16.3'	91.9°	12
13	42°25.7'	+07.0'	85.1°	42°30.4'	+08.5'	86.0°	42°34.2'	+09.9'	86.9°	42°37.0'	+11.3'	87.8°	42°38.8'	+12.7'	88.7°	42°39.6'	+14.0'	89.6°	42°39.5'	+15.4'	90.6°	13
14	42°32.8'	+06.1'	83.7°	42°38.9'	+07.5'	84.6°	42°44.0'	+08.9'	85.5°	42°48.2'	+10.3'	86.5°	42°51.4'	+11.7'	87.4°	42°53.7'	+13.1'	88.3°	42°55.0'	+14.5'	89.2°	14
15	42°38.9'	+05.1'	82.4°	42°46.4'	+06.5'	83.3°	42°52.9'	+08.0'	84.2°	42°58.5'	+09.4'	85.1°	43°03.1'	+10.8'	86.1°	43°06.8'	+12.2'	87.0°	43°09.5'	+13.6'	87.9°	15
16	42°44.0'	+04.2'	81.0°	42°52.9'	+05.6'	81.9°	43°00.9'	+07.0'	82.8°	43°07.9'	+08.4'	83.8°	43°13.9'	+09.8'	84.7°	43°19.0'	+11.2'	85.6°	43°23.0'	+12.6'	86.6°	16
17	42°48.2'	+03.2'	79.6°	42°58.5'	+04.6'	80.6°	43°07.9'	+06.0'	81.5°	43°16.3'	+07.4'	82.4°	43°23.7'	+08.9'	83.3°	43°30.2'	+10.3'	84.3°	43°35.7'	+11.7'	85.2°	17
18	42°51.4'	+02.2'	78.3°	43°03.1'	+03.6'	79.2°	43°13.9'	+05.1'	80.1°	43°23.7'	+06.5'	81.0°	43°32.6'	+07.9'	82.0°	43°40.5'	+09.3'	82.9°	43°47.4'	+10.7'	83.9°	18
19	42°53.7'	+01.3'	76.9°	43°06.8'	+02.7'	77.8°	43°19.0'	+04.1'	78.7°	43°30.2'	+05.5'	79.7°	43°40.5'	+06.9'	80.6°	43°49.8'	+08.3'	81.6°	43°58.1'	+09.7'	82.5°	19
20	42°55.0'	+00.3'	75.6°	43°09.5'	+01.7'	76.5°	43°23.0'	+03.1'	77.4°	43°35.7'	+04.5'	78.3°	43°47.4'	+05.9'	79.2°	43°58.1'	+07.3'	80.2°	44°07.8'	+08.7'	81.1°	20
21	42°55.3'	-00.7'	74.2°	43°11.1'	+00.7'	75.1°	43°26.1'	+02.1'	76.0°	43°40.2'	+03.5'	76.9°	43°53.3'	+04.9'	77.9°	44°05.4'	+06.3'	7				

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

50° 310° LHA

Latitude SAME as Declination

50° 310° LHA

Dec°	14			15			16			17			18			19			20			Dec°			
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°				
0	38°35.2'	+18.2'	101.5°	38°22.8'	+19.4'	102.3°	38°09.7'	+20.7'	103.0°	37°55.8'	+21.9'	103.8°	37°41.1'	+23.1'	104.5°	37°25.7'	+24.3'	105.3°	37°09.5'	+25.4'	106.0°	0			
1	38°53.4'	+17.4'	100.3°	38°42.3'	+18.7'	101.0°	38°30.4'	+19.9'	101.8°	38°17.7'	+21.2'	102.6°	38°04.2'	+22.4'	103.4°	37°50.0'	+23.6'	104.1°	37°34.9'	+24.8'	104.9°	1			
2	39°10.8'	+16.6'	99.0°	39°01.0'	+17.9'	99.8°	38°50.3'	+19.2'	100.6°	38°38.9'	+20.4'	101.4°	38°26.6'	+21.7'	102.2°	38°13.5'	+22.9'	103.0°	37°59.7'	+24.1'	103.7°	2			
3	39°27.4'	+15.8'	97.8°	39°18.9'	+17.1'	98.6°	39°09.5'	+18.4'	99.4°	38°59.3'	+19.7'	100.2°	38°48.3'	+20.9'	101.0°	38°36.4'	+22.2'	101.8°	38°23.8'	+23.4'	102.6°	3			
4	39°43.3'	+15.0'	96.5°	39°36.0'	+16.3'	97.4°	39°27.9'	+17.6'	98.2°	39°19.0'	+18.9'	99.0°	39°09.2'	+20.2'	99.8°	38°58.6'	+21.4'	100.6°	38°47.1'	+22.7'	101.4°	4			
5	39°58.3'	+14.2'	95.3°	39°52.3'	+15.5'	96.1°	39°45.5'	+16.8'	96.9°	39°37.9'	+18.1'	97.8°	39°29.4'	+19.4'	98.6°	39°20.0'	+20.7'	99.4°	39°09.8'	+21.9'	100.2°	5			
6	40°12.5'	+13.4'	94.0°	40°07.9'	+14.7'	94.8°	40°02.4'	+16.0'	95.7°	39°56.0'	+17.3'	96.5°	39°48.8'	+18.6'	97.3°	39°40.7'	+19.9'	98.2°	39°31.7'	+21.2'	99.0°	6			
7	40°25.8'	+12.5'	92.7°	40°22.6'	+13.9'	93.6°	40°18.4'	+15.2'	94.4°	40°13.3'	+16.5'	95.3°	40°07.4'	+17.8'	96.1°	40°00.6'	+19.1'	96.9°	39°52.9'	+20.4'	97.8°	7			
8	40°38.4'	+11.6'	91.4°	40°36.4'	+13.0'	92.3°	40°33.6'	+14.3'	93.1°	40°29.8'	+15.7'	94.0°	40°25.2'	+17.0'	94.8°	40°19.7'	+18.3'	95.7°	40°13.3'	+19.6'	96.5°	8			
9	40°50.0'	+10.8'	90.1°	40°49.4'	+12.1'	91.0°	40°47.9'	+13.5'	91.9°	40°45.5'	+14.8'	92.7°	40°42.2'	+16.2'	93.6°	40°38.0'	+17.5'	94.4°	40°32.9'	+18.8'	95.3°	9			
10	41°00.8'	+09.9'	88.8°	41°01.5'	+11.3'	89.7°	41°01.4'	+12.6'	90.6°	41°00.3'	+14.0'	91.4°	40°58.4'	+15.3'	92.3°	40°55.5'	+16.7'	93.2°	40°51.7'	+18.0'	94.0°	10			
11	41°10.7'	+09.0'	87.5°	41°12.8'	+10.4'	88.4°	41°14.0'	+11.7'	89.3°	41°14.3'	+13.1'	90.2°	41°13.7'	+14.5'	91.0°	41°12.2'	+15.8'	91.9°	41°09.7'	+17.2'	92.8°	11			
12	41°19.7'	+08.1'	86.2°	41°23.2'	+09.5'	87.1°	41°25.7'	+10.8'	88.0°	41°27.4'	+12.2'	88.9°	41°28.1'	+13.6'	89.7°	41°28.0'	+14.9'	90.6°	41°26.8'	+16.3'	91.5°	12			
13	41°27.7'	+07.2'	84.9°	41°32.6'	+08.6'	85.8°	41°36.6'	+09.9'	86.7°	41°39.6'	+11.3'	87.5°	41°41.7'	+12.7'	88.4°	41°42.9'	+14.1'	89.3°	41°43.1'	+15.4'	90.2°	13			
14	41°34.9'	+06.3'	83.6°	41°41.2'	+07.6'	84.4°	41°46.5'	+09.0'	85.3°	41°51.0'	+10.4'	86.2°	41°54.4'	+11.8'	87.1°	41°57.0'	+13.2'	88.0°	41°58.6'	+14.5'	88.9°	14			
15	41°41.2'	+05.3'	82.2°	41°48.8'	+06.7'	83.1°	41°55.6'	+08.1'	84.0°	42°01.4'	+09.5'	84.9°	42°06.2'	+10.9'	85.8°	42°10.1'	+12.3'	86.7°	42°13.1'	+13.6'	87.6°	15			
16	41°46.5'	+04.4'	80.9°	41°55.6'	+05.8'	81.8°	42°03.7'	+07.2'	82.7°	42°10.9'	+08.6'	83.6°	42°17.1'	+10.0'	84.5°	42°22.4'	+11.4'	85.4°	42°26.8'	+12.7'	86.3°	16			
17	41°51.0'	+03.5'	79.6°	42°01.4'	+04.9'	80.4°	42°10.9'	+06.2'	81.3°	42°19.4'	+07.6'	82.2°	42°27.1'	+09.0'	83.1°	42°33.8'	+10.4'	84.1°	42°39.5'	+11.8'	85.0°	17			
18	41°54.4'	+02.5'	78.2°	42°06.2'	+03.9'	79.1°	42°17.1'	+05.3'	80.0°	42°27.1'	+06.7'	80.9°	42°36.1'	+08.1'	81.8°	42°44.2'	+09.5'	82.7°	42°51.3'	+10.9'	83.6°	18			
19	41°57.0'	+01.6'	76.9°	42°10.1'	+03.0'	77.8°	42°22.4'	+04.4'	78.6°	42°33.8'	+05.7'	79.5°	42°44.2'	+07.1'	80.5°	42°53.7'	+08.5'	81.4°	43°02.2'	+09.9'	82.3°	19			
20	41°58.6'	+00.7'	75.5°	42°13.1'	+02.0'	76.4°	42°26.8'	+03.4'	77.3°	42°39.5'	+04.8'	78.2°	42°51.3'	+06.2'	79.1°	43°02.2'	+07.6'	80.0°	43°12.1'	+09.0'	80.9°	20			
21	41°59.2'	-00.3'	74.2°	42°15.1'	+01.1'	75.1°	42°30.2'	+02.4'	75.9°	42°44.3'	+03.8'	76.8°	42°57.5'	+05.2'	77.7°	43°09.8'	+06.6'	78.7°	43°21.1'	+08.0'	79.6°	21			
22	41°59.0'	-01.2'	72.8°	42°16.2'	+00.1'	73.7°	42°32.6'	+01.5'	74.6°	42°48.1'	+02.9'	75.5°	43°02.7'	+04.2'	76.4°	43°02.7'	+04.2'	76.4°	43°29.1'	+07.0'	78.2°	22			
23	41°57.7'	-02.2'	71.5°	42°16.3'	-00.8'	72.4°	42°34.1'	+00.5'	73.2°	42°51.0'	+01.9'	74.1°	43°06.9'	+03.3'	75.0°	43°22.0'	+04.6'	75.9°	43°36.1'	+06.0'	76.8°	23			
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20					Dec°	

50° 310° LHA

Latitude SAME as Declination

50° 310° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

51° 309° LHA

Latitude SAME as Declination

51° 309° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	37°38.1'	+18.0'	101.1°	37°26.2'	+19.2'	101.8°	37°13.5'	+20.4'	102.6°	37°00.0'	+21.6'	103.3°	36°45.8'	+22.8'	104.0°	36°30.9'	+24.0'	104.8°	36°15.2'	+25.1'	105.5°	0
1	37°56.1'	+17.2'	99.9°	37°45.4'	+18.5'	100.6°	37°33.9'	+19.7'	101.4°	37°21.7'	+20.9'	102.1°	37°08.6'	+22.1'	102.9°	36°54.9'	+23.3'	103.6°	36°40.4'	+24.5'	104.4°	1
2	38°13.3'	+16.5'	98.7°	38°03.8'	+17.7'	99.4°	37°53.6'	+19.0'	100.2°	37°42.6'	+20.2'	101.0°	37°30.8'	+21.4'	101.7°	37°18.2'	+22.6'	102.5°	37°04.9'	+23.8'	103.2°	2
3	38°29.7'	+15.7'	97.4°	38°21.6'	+17.0'	98.2°	38°12.6'	+18.2'	99.0°	38°02.8'	+19.5'	99.8°	37°52.2'	+20.7'	100.5°	37°40.8'	+21.9'	101.3°	37°28.7'	+23.1'	102.1°	3
4	38°45.4'	+14.9'	96.2°	38°38.5'	+16.2'	97.0°	38°30.8'	+17.5'	97.8°	38°22.3'	+18.7'	98.6°	38°12.9'	+20.0'	99.4°	38°02.8'	+21.2'	100.1°	37°51.8'	+22.4'	100.9°	4
5	39°00.3'	+14.1'	95.0°	38°54.7'	+15.4'	95.8°	38°48.3'	+16.7'	96.6°	38°41.0'	+18.0'	97.4°	38°32.9'	+19.2'	98.1°	38°24.0'	+20.5'	98.9°	38°14.3'	+21.7'	99.7°	5
6	39°14.4'	+13.3'	93.7°	39°10.1'	+14.6'	94.5°	39°05.0'	+15.9'	95.3°	38°59.0'	+17.2'	96.1°	38°52.1'	+18.5'	96.9°	38°44.5'	+19.7'	97.7°	38°36.0'	+21.0'	98.5°	6
7	39°27.7'	+12.5'	92.4°	39°24.7'	+13.8'	93.3°	39°20.9'	+15.1'	94.1°	39°16.2'	+16.4'	94.9°	39°10.6'	+17.7'	95.7°	39°04.2'	+19.0'	96.5°	38°57.0'	+20.3'	97.3°	7
8	39°40.1'	+11.6'	91.2°	39°38.5'	+13.0'	92.0°	39°36.0'	+14.3'	92.8°	39°32.6'	+15.6'	93.7°	39°28.3'	+16.9'	94.5°	39°23.2'	+18.2'	95.3°	39°17.3'	+19.5'	96.1°	8
9	39°51.8'	+10.8'	89.9°	39°51.5'	+12.1'	90.7°	39°50.3'	+13.5'	91.6°	39°48.2'	+14.8'	92.4°	39°45.2'	+16.1'	93.2°	39°41.4'	+17.4'	94.1°	39°36.7'	+18.7'	94.9°	9
10	40°02.6'	+09.9'	88.6°	40°03.6'	+11.3'	89.5°	40°03.7'	+12.6'	90.3°	40°03.0'	+14.0'	91.1°	40°01.3'	+15.3'	92.0°	39°58.8'	+16.6'	92.8°	39°55.5'	+17.9'	93.6°	10
11	40°12.5'	+09.1'	87.3°	40°14.9'	+10.4'	88.2°	40°16.3'	+11.8'	89.0°	40°16.9'	+13.1'	89.9°	40°16.6'	+14.5'	90.7°	40°15.4'	+15.8'	91.6°	40°13.4'	+17.1'	92.4°	11
12	40°21.6'	+08.2'	86.0°	40°25.3'	+09.6'	86.9°	40°28.1'	+10.9'	87.7°	40°30.0'	+12.3'	88.6°	40°31.1'	+13.6'	89.4°	40°31.2'	+15.0'	90.3°	40°30.5'	+16.3'	91.1°	12
13	40°29.8'	+07.3'	84.7°	40°34.8'	+08.7'	85.6°	40°39.0'	+10.0'	86.4°	40°42.3'	+11.4'	87.3°	40°44.7'	+12.8'	88.2°	40°46.2'	+14.1'	89.0°	40°46.8'	+15.4'	89.9°	13
14	40°37.1'	+06.4'	83.4°	40°43.5'	+07.8'	84.3°	40°49.1'	+09.2'	85.1°	40°53.7'	+10.5'	86.0°	40°57.4'	+11.9'	86.9°	41°00.3'	+13.2'	87.7°	41°02.2'	+14.6'	88.6°	14
15	40°43.5'	+05.5'	82.1°	40°51.3'	+06.9'	83.0°	40°58.2'	+08.3'	83.8°	41°04.2'	+09.6'	84.7°	41°09.3'	+11.0'	85.6°	41°13.5'	+12.4'	86.4°	41°16.8'	+13.7'	87.3°	15
16	40°49.1'	+04.6'	80.8°	40°58.2'	+06.0'	81.6°	41°06.5'	+07.4'	82.5°	41°13.9'	+08.7'	83.4°	41°20.3'	+10.1'	84.3°	41°25.9'	+11.5'	85.1°	41°30.5'	+12.8'	86.0°	16
17	40°53.7'	+03.7'	79.5°	41°04.2'	+05.1'	80.3°	41°13.9'	+06.5'	81.2°	41°22.6'	+07.8'	82.1°	41°30.4'	+09.2'	82.9°	41°37.4'	+10.6'	83.8°	41°43.4'	+11.9'	84.7°	17
18	40°57.4'	+02.8'	78.2°	41°09.3'	+04.2'	79.0°	41°20.3'	+05.6'	79.9°	41°30.4'	+06.9'	80.7°	41°39.6'	+08.3'	81.6°	41°47.9'	+09.7'	82.5°	41°55.3'	+11.0'	83.4°	18
19	41°00.3'	+01.9'	76.8°	41°13.5'	+03.3'	77.7°	41°25.9'	+04.6'	78.5°	41°37.4'	+06.0'	79.4°	41°47.9'	+07.4'	80.3°	41°57.6'	+08.7'	81.2°	42°06.3'	+10.1'	82.1°	19
20	41°02.2'	+01.0'	75.5°	41°16.8'	+02.4'	76.4°	41°30.5'	+03.7'	77.2°	41°43.4'	+05.1'	78.1°	41°55.3'	+06.4'	79.0°	42°06.3'	+07.8'	79.8°	42°16.5'	+09.2'	80.7°	20
21	41°03.2'	+00.1'	74.2°	41°19.2'	+01.4'	75.0°	41°34.2'	+02.8'	75.9°	41°48.4'	+04.1'	76.7°	42°01.7'	+05.5'	77.6°							

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

52° 308° LHA

Latitude SAME as Declination

52° 308° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	36°40.9'	+17.7'	100.7°	36°29.4'	+19.0'	101.4°	36°17.1'	+20.2'	102.2°	36°04.1'	+21.4'	102.9°	35°50.4'	+22.5'	103.6°	35°36.0'	+23.7'	104.3°	35°20.8'	+24.9'	105.0°	0
1	36°58.7'	+17.0'	99.5°	36°48.4'	+18.3'	100.2°	36°37.3'	+19.5'	101.0°	36°25.5'	+20.7'	101.7°	36°13.0'	+21.9'	102.4°	35°59.7'	+23.1'	103.1°	35°45.7'	+24.2'	103.8°	1
2	37°15.7'	+16.3'	98.3°	37°06.6'	+17.5'	99.1°	36°56.8'	+18.8'	99.8°	36°46.2'	+20.0'	100.5°	36°34.9'	+21.2'	101.3°	36°22.8'	+22.4'	102.0°	36°09.9'	+23.6'	102.7°	2
3	37°32.0'	+15.5'	97.1°	37°24.2'	+16.8'	97.9°	37°15.6'	+18.1'	98.6°	37°06.2'	+19.3'	99.4°	36°56.1'	+20.5'	100.1°	36°45.2'	+21.7'	100.8°	36°33.5'	+22.9'	101.6°	3
4	37°47.5'	+14.8'	95.9°	37°41.0'	+16.1'	96.6°	37°33.6'	+17.3'	97.4°	37°25.5'	+18.6'	98.2°	37°16.6'	+19.8'	98.9°	37°06.9'	+21.0'	99.7°	36°56.4'	+22.2'	100.4°	4
5	38°02.3'	+14.0'	94.6°	37°57.0'	+15.3'	95.4°	37°50.9'	+16.6'	96.2°	37°44.1'	+17.8'	97.0°	37°36.4'	+19.1'	97.7°	37°27.9'	+20.3'	98.5°	37°18.7'	+21.6'	99.3°	5
6	38°16.3'	+13.2'	93.4°	38°12.3'	+14.5'	94.2°	38°07.5'	+15.8'	95.0°	38°01.9'	+17.1'	95.8°	37°55.5'	+18.3'	96.5°	37°48.2'	+19.6'	97.3°	37°40.2'	+20.8'	98.1°	6
7	38°29.5'	+12.4'	92.2°	38°26.8'	+13.7'	93.0°	38°23.3'	+15.0'	93.8°	38°19.0'	+16.3'	94.5°	38°13.8'	+17.6'	95.3°	38°07.8'	+18.9'	96.1°	38°01.0'	+20.1'	96.9°	7
8	38°41.9'	+11.6'	90.9°	38°40.6'	+12.9'	91.7°	38°38.3'	+14.2'	92.5°	38°35.3'	+15.5'	93.3°	38°31.4'	+16.8'	94.1°	38°26.7'	+18.1'	94.9°	38°21.2'	+19.4'	95.7°	8
9	38°53.6'	+10.8'	89.7°	38°53.5'	+12.1'	90.5°	38°52.6'	+13.4'	91.3°	38°50.8'	+14.8'	92.1°	38°48.3'	+16.1'	92.9°	38°44.8'	+17.3'	93.7°	38°40.6'	+18.6'	94.5°	9
10	39°04.4'	+10.0'	88.4°	39°05.6'	+11.3'	89.2°	39°06.0'	+12.6'	90.0°	39°05.6'	+14.0'	90.8°	39°04.3'	+15.3'	91.6°	39°02.2'	+16.6'	92.5°	38°59.2'	+17.9'	93.3°	10
11	39°14.4'	+09.1'	87.1°	39°16.9'	+10.5'	87.9°	39°18.7'	+11.8'	88.8°	39°19.6'	+13.1'	89.6°	39°19.6'	+14.5'	90.4°	39°18.7'	+15.8'	91.2°	39°17.0'	+17.1'	92.0°	11
12	39°23.5'	+08.3'	85.8°	39°27.4'	+09.6'	86.7°	39°30.5'	+11.0'	87.5°	39°32.7'	+12.3'	88.3°	39°34.0'	+13.6'	89.1°	39°34.5'	+15.0'	90.0°	39°34.1'	+16.3'	90.8°	12
13	39°31.8'	+07.5'	84.6°	39°37.1'	+08.8'	85.4°	39°41.5'	+10.1'	86.2°	39°45.0'	+11.5'	87.0°	39°47.7'	+12.8'	87.9°	39°49.5'	+14.1'	88.7°	39°50.4'	+15.5'	89.5°	13
14	39°39.3'	+06.6'	83.3°	39°45.9'	+07.9'	84.1°	39°51.6'	+09.3'	84.9°	39°56.5'	+10.6'	85.8°	40°00.5'	+12.0'	86.6°	40°03.6'	+13.3'	87.4°	40°05.8'	+14.6'	88.3°	14
15	39°45.9'	+05.7'	82.0°	39°53.8'	+07.1'	82.8°	40°00.9'	+08.4'	83.6°	40°07.1'	+09.8'	84.5°	40°12.4'	+11.1'	85.3°	40°16.9'	+12.5'	86.2°	40°20.5'	+13.8'	87.0°	15
16	39°51.6'	+04.9'	80.7°	40°00.9'	+06.2'	81.5°	40°09.3'	+07.6'	82.3°	40°16.9'	+08.9'	83.2°	40°23.6'	+10.3'	84.0°	40°29.4'	+11.6'	84.9°	40°34.3'	+12.9'	85.7°	16
17	39°56.5'	+04.0'	79.4°	40°07.1'	+05.3'	80.2°	40°16.9'	+06.7'	81.0°	40°25.8'	+08.0'	81.9°	40°33.8'	+09.4'	82.7°	40°41.0'	+10.7'	83.6°	40°47.2'	+12.1'	84.4°	17
18	40°00.5'	+03.1'	78.1°	40°12.4'	+04.5'	78.9°	40°23.6'	+05.8'	79.7°	40°33.8'	+07.1'	80.6°	40°43.2'	+08.5'	81.4°	40°51.7'	+09.9'	82.3°	40°59.3'	+11.2'	83.1°	18
19	40°03.6'	+02.2'	76.8°	40°16.9'	+03.6'	77.6°	40°29.4'	+04.9'	78.4°	40°41.0'	+06.3'	79.3°	40°51.7'	+07.6'	80.1°	41°01.6'	+09.0'	81.0°	41°10.5'	+10.3'	81.8°	19
20	40°05.8'	+01.4'	75.5°	40°20.5'	+02.7'	76.3°	40°34.3'	+04.0'	77.1°	40°47.2'	+05.4'	78.0°	40°59.3'	+06.7'	78.8°	41°10.5'	+08.1'	79.7°	41°20.8'	+09.4'	80.5°	20
21	40°07.2'	+00.5'	74.2°	40°23.2'	+01.8'	75.0°	40°38.3'	+03.1'	75.8°	40°52.6'	+04.5'	76.6°	41°06.0'	+05.8'	77.5°	41°18.6'	+07.2'	78.3°	41°30.3'	+08.5'	79.2°	21
22	40°07.7'	-00.4'	72.9°	40°25.0'	+00.9'	73.7°	40°41.4'	+02.2'	74.5°	40°51.4'	+03.6'	75.3°	41°11.8'	+04.9'	76.2°	41°25.7'	+06.2'	77.0°	41°38.8'	+07.6'	77.9°	22
23	40°07.3'	-01.3'	71.5°	40°25.9'	+00.0'	72.4°	40°43.7'	+01.3'	73.2°	41°00.6'	+02.7'	74.0°	41°16.7'	+04.0'	74.8°	41°32.0'	+05.3'	75.7°	41°46.4'	+06.7'	76.6°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

52° 308° LHA

Latitude SAME as Declination

52° 308° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

53° 307° LHA

Latitude SAME as Declination

53° 307° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	35°43.7'	+17.5'	100.3°	35°32.6'	+18.7'	101.0°	35°20.7'	+19.9'	101.7°	35°08.2'	+21.1'	102.4°	34°54.9'	+22.3'	103.1°	34°40.9'	+23.4'	103.8°	34°26.3'	+24.6'	104.5°	0
1	36°01.2'	+16.8'	99.2°	35°51.3'	+18.1'	99.9°	35°40.7'	+19.3'	100.6°	35°29.3'	+20.5'	101.3°	35°17.2'	+21.7'	102.0°	35°04.4'	+22.8'	102.7°	34°50.9'	+24.0'	103.3°	1
2	36°18.1'	+16.1'	98.0°	36°09.4'	+17.4'	98.7°	36°00.0'	+18.6'	99.4°	35°49.8'	+19.8'	100.1°	35°38.8'	+21.0'	100.8°	35°27.2'	+22.2'	101.5°	35°14.9'	+23.3'	102.2°	2
3	36°34.2'	+15.4'	96.8°	36°26.7'	+16.7'	97.5°	36°18.5'	+17.9'	98.2°	36°09.6'	+19.1'	99.0°	35°59.8'	+20.3'	99.7°	35°49.4'	+21.5'	100.4°	35°38.2'	+22.7'	101.1°	3
4	36°49.6'	+14.7'	95.6°	36°43.4'	+15.9'	96.3°	36°36.4'	+17.2'	97.0°	36°28.7'	+18.4'	97.8°	36°20.2'	+19.6'	98.5°	36°10.9'	+20.9'	99.2°	36°00.9'	+22.1'	100.0°	4
5	37°04.2'	+13.9'	94.3°	36°59.3'	+15.2'	95.1°	36°53.6'	+16.5'	95.8°	36°47.1'	+17.7'	96.6°	36°39.8'	+18.9'	97.3°	36°31.8'	+20.2'	98.1°	36°23.0'	+21.4'	98.8°	5
6	37°18.2'	+13.2'	93.1°	37°14.5'	+14.4'	93.9°	37°10.0'	+15.7'	94.6°	37°04.8'	+17.0'	95.4°	36°58.8'	+18.2'	96.1°	36°51.9'	+19.5'	96.9°	36°44.4'	+20.7'	97.6°	6
7	37°31.3'	+12.4'	91.9°	37°28.9'	+13.7'	92.7°	37°25.8'	+15.0'	93.4°	37°21.8'	+16.2'	94.2°	37°17.0'	+17.5'	95.0°	37°11.4'	+18.8'	95.7°	37°05.1'	+20.0'	96.5°	7
8	37°43.7'	+11.6'	90.7°	37°42.6'	+12.9'	91.4°	37°40.7'	+14.2'	92.2°	37°38.0'	+15.5'	93.0°	37°34.5'	+16.8'	93.7°	37°30.2'	+18.0'	94.5°	37°25.0'	+19.3'	95.3°	8
9	37°55.3'	+10.8'	89.4°	37°55.5'	+12.1'	90.2°	37°54.9'	+13.4'	91.0°	37°53.5'	+14.7'	91.8°	37°51.3'	+16.0'	92.5°	37°48.2'	+17.3'	93.3°	37°44.3'	+18.6'	94.1°	9
10	38°06.2'	+10.0'	88.2°	38°07.7'	+11.3'	89.0°	38°08.4'	+12.7'	89.7°	38°08.2'	+14.0'	90.5°	38°07.3'	+15.2'	91.3°	38°05.5'	+16.5'	92.1°	38°02.9'	+17.8'	92.9°	10
11	38°16.2'	+09.2'	86.9°	38°19.0'	+10.5'	87.7°	38°21.0'	+11.9'	88.5°	38°22.2'	+13.2'	89.3°	38°22.5'	+14.5'	90.1°	38°22.0'	+15.8'	90.9°	38°20.7'	+17.0'	91.7°	11
12	38°25.4'	+08.4'	85.7°	38°29.6'	+09.7'	86.4°	38°32.9'	+11.1'	87.2°	38°35.3'	+12.4'	88.0°	38°37.0'	+13.7'	88.8°	38°37.8'	+15.0'	89.6°	38°37.7'	+16.3'	90.4°	12
13	38°33.9'	+07.6'	84.4°	38°39.3'	+08.9'	85.2°	38°43.9'	+10.2'	86.0°	38°47.7'	+11.6'	86.8°	38°50.6'	+12.9'	87.6°	38°52.8'	+14.2'	88.4°	38°54.0'	+15.5'	89.2°	13
14	38°41.5'	+06.8'	83.1°	38°48.2'	+08.1'	83.9°	38°54.2'	+09.4'	84.7°	38°59.3'	+10.7'	85.5°	39°03.5'	+12.1'	86.3°	39°06.9'	+13.4'	87.1°	39°09.5'	+14.7'	88.0°	14
15	38°48.2'	+05.9'	81.8°	38°56.3'	+07.3'	82.6°	39°03.6'	+08.6'	83.5°	39°10.0'	+09.9'	84.3°	39°15.6'	+11.2'	85.1°	39°20.3'	+12.6'	85.9°	39°24.2'	+13.9'	86.7°	15
16	38°54.2'	+05.1'	80.6°	39°03.6'	+06.4'	81.4°	39°12.2'	+07.7'	82.2°	39°19.9'	+09.1'	83.0°	39°26.8'	+10.4'	83.8°	39°32.9'	+11.7'	84.6°	39°38.1'	+13.1'	85.4°	16
17	38°59.3'	+04.3'	79.3°	39°10.0'	+05.6'	80.1°	39°19.9'	+06.9'	80.9°	39°29.0'	+08.2'	81.7°	39°37.2'	+09.6'	82.5°	39°44.6'	+10.9'	83.3°	39°51.1'	+12.2'	84.2°	17
18	39°03.5'	+03.4'	78.0°	39°15.6'	+04.7'	78.8°	39°26.8'	+06.1'	79.6°	39°37.2'	+07.4'	80.4°	39°46.8'	+08.7'	81.2°	39°55.5'	+10.0'	82.1°	40°03.3'	+11.4'	82.9°	18
19	39°06.9'	+02.6'	76.7°	39°20.3'	+03.9'	77.5°	39°32.9'	+05.2'	78.3°	39°44.6'	+06.5'	79.1°	39°55.5'	+07.8'	80.0°	40°05.5'	+09.2'	80.8°	40°14.7'	+10.5'	81.6°	19
20	39°09.5'	+01.7'	75.4°	39°24.2'	+03.0'	76.2°	39°38.1'	+04.3'	77.0°	39°51.1'	+05.7'	77.8°	40°03.3'	+07.0'	78.7°	40°14.7'	+08.3'	79.5°	40°25.2'	+09.7'	80.3°	20
21	39°11.2'	+00.9'	74.1°	39°27.2'	+02.2'	74.9°	39°42.4'	+03.5'	75.7°	39°56.8'	+04.8'	76.5°	40°10.3'	+06.1'	77.4°	40°23.0'	+07.4'	78.2°	40°34.9'			

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

54° 306° LHA

Latitude SAME as Declination

54° 306° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	34°46.4'	+17.3'	100.0°	34°35.6'	+18.5'	100.6°	34°24.2'	+19.7'	101.3°	34°12.1'	+20.9'	102.0°	33°59.3'	+22.1'	102.7°	33°45.8'	+23.2'	103.3°	33°31.7'	+24.3'	104.0°	0
1	35°03.7'	+16.7'	98.8°	34°54.2'	+17.9'	99.5°	34°43.9'	+19.1'	100.2°	34°33.0'	+20.3'	100.9°	34°21.3'	+21.4'	101.5°	34°09.0'	+22.6'	102.2°	33°56.0'	+23.7'	102.9°	1
2	35°20.4'	+16.0'	97.6°	35°12.0'	+17.2'	98.3°	35°03.0'	+18.4'	99.0°	34°53.2'	+19.6'	99.7°	34°42.8'	+20.8'	100.4°	34°31.6'	+22.0'	101.1°	34°19.7'	+23.1'	101.7°	2
3	35°36.3'	+15.3'	96.4°	35°29.2'	+16.5'	97.2°	35°21.4'	+17.7'	97.9°	35°12.8'	+18.9'	98.6°	35°03.6'	+20.1'	99.3°	34°53.6'	+21.3'	99.9°	34°42.8'	+22.5'	100.6°	3
4	35°51.6'	+14.6'	95.3°	35°45.8'	+15.8'	96.0°	35°39.1'	+17.0'	96.7°	35°31.8'	+18.3'	97.4°	35°23.7'	+19.5'	98.1°	35°14.9'	+20.7'	98.8°	35°05.3'	+21.9'	99.5°	4
5	36°06.2'	+13.8'	94.1°	36°01.6'	+15.1'	94.8°	35°56.2'	+16.3'	95.5°	35°50.1'	+17.6'	96.2°	35°43.2'	+18.8'	96.9°	35°35.6'	+20.0'	97.6°	35°27.2'	+21.2'	98.4°	5
6	36°20.0'	+13.1'	92.8°	36°16.7'	+14.4'	93.6°	36°12.5'	+15.6'	94.3°	36°07.6'	+16.9'	95.0°	36°02.0'	+18.1'	95.8°	35°55.6'	+19.3'	96.5°	35°48.4'	+20.6'	97.2°	6
7	36°33.1'	+12.4'	91.6°	36°31.0'	+13.6'	92.4°	36°28.2'	+14.9'	93.1°	36°24.5'	+16.2'	93.8°	36°20.1'	+17.4'	94.6°	36°14.9'	+18.7'	95.3°	36°09.0'	+19.9'	96.0°	7
8	36°45.5'	+11.6'	90.4°	36°44.7'	+12.9'	91.2°	36°43.1'	+14.2'	91.9°	36°40.7'	+15.4'	92.7°	36°37.5'	+16.7'	93.4°	36°33.6'	+18.0'	94.1°	36°28.9'	+19.2'	94.9°	8
9	36°57.1'	+10.9'	89.2°	36°57.6'	+12.1'	89.9°	36°57.3'	+13.4'	90.7°	36°56.1'	+14.7'	91.4°	36°54.2'	+16.0'	92.2°	36°51.5'	+17.2'	92.9°	36°48.1'	+18.5'	93.7°	9
10	37°08.0'	+10.1'	88.0°	37°09.7'	+11.4'	88.7°	37°10.7'	+12.7'	89.5°	37°10.8'	+14.0'	90.2°	37°10.2'	+15.2'	91.0°	37°08.8'	+16.5'	91.7°	37°06.6'	+17.8'	92.5°	10
11	37°18.1'	+09.3'	86.7°	37°21.1'	+10.6'	87.5°	37°23.4'	+11.9'	88.2°	37°24.8'	+13.2'	89.0°	37°25.4'	+14.5'	89.8°	37°25.3'	+15.8'	90.5°	37°24.3'	+17.0'	91.3°	11
12	37°27.4'	+08.5'	85.5°	37°31.7'	+09.8'	86.2°	37°35.3'	+11.1'	87.0°	37°38.0'	+12.4'	87.8°	37°39.9'	+13.7'	88.5°	37°41.0'	+15.0'	89.3°	37°41.4'	+16.3'	90.1°	12
13	37°35.9'	+07.7'	84.2°	37°41.6'	+09.0'	85.0°	37°46.4'	+10.3'	85.8°	37°50.4'	+11.6'	86.5°	37°53.6'	+12.9'	87.3°	37°56.0'	+14.2'	88.1°	37°57.6'	+15.5'	88.9°	13
14	37°43.7'	+06.9'	83.0°	37°50.6'	+08.2'	83.7°	37°56.7'	+09.6'	84.5°	38°02.1'	+10.9'	85.3°	38°06.6'	+12.2'	86.1°	38°10.3'	+13.5'	86.9°	38°13.2'	+14.8'	87.6°	14
15	37°50.6'	+06.1'	81.7°	37°58.9'	+07.4'	82.5°	38°06.3'	+08.7'	83.3°	38°12.9'	+10.1'	84.0°	38°18.7'	+11.4'	84.8°	38°23.7'	+12.7'	85.6°	38°27.9'	+14.0'	86.4°	15
16	37°56.7'	+05.3'	80.5°	38°06.3'	+06.6'	81.2°	38°15.0'	+07.9'	82.0°	38°23.0'	+09.2'	82.8°	38°30.1'	+10.6'	83.6°	38°36.4'	+11.9'	84.4°	38°41.9'	+13.2'	85.2°	16
17	38°02.1'	+04.5'	79.2°	38°12.9'	+05.8'	80.0°	38°23.0'	+07.1'	80.7°	38°32.2'	+08.4'	81.5°	38°40.7'	+09.7'	82.3°	38°48.3'	+11.1'	83.1°	38°55.0'	+12.4'	83.9°	17
18	38°06.6'	+03.7'	77.9°	38°18.7'	+05.0'	78.7°	38°30.1'	+06.3'	79.5°	38°40.7'	+07.6'	80.3°	38°50.4'	+08.9'	81.1°	38°59.3'	+10.2'	81.9°	39°07.4'	+11.5'	82.7°	18
19	38°10.3'	+02.9'	76.7°	38°23.7'	+04.2'	77.4°	38°36.4'	+05.5'	78.2°	38°48.3'	+06.8'	79.0°	38°59.3'	+08.1'	79.8°	39°09.6'	+09.4'	80.6°	39°19.0'	+10.7'	81.4°	19
20	38°13.2'	+02.1'	75.4°	38°27.9'	+03.3'	76.2°	38°41.9'	+04.6'	76.9°	38°55.0'	+05.9'	77.7°	39°07.4'	+07.3'	78.5°	39°19.0'	+08.6'	79.3°	39°29.7'	+09.9'	80.1°	20
21	38°15.2'	+01.2'	74.1°	38°31.3'	+02.5'	74.9°	38°46.5'	+03.8'	75.6°	39°01.0'	+05.1'	76.4°	39°14.7'	+06.4'	77.2°	39°27.5'	+07.7'	78.0°	39°39.6'	+09.0'	78.8°	21
22	38°16.4'	+00.4'	72.8°	38°33.8'	+01.7'	73.6°	38°50.3'	+03.0'	74.4°	39°06.1'	+04.3'	75.1°	39°21.1'	+05.6'	75.9°	39°35.2'	+06.9'	76.7°	39°48.6'	+08.2'	77.5°	22
23	38°16.8'	-00.4'	71.6°	38°35.4'	+00.8'	72.3°	38°53.3'	+02.1'	73.1°	39°10.3'	+03.4'	73.9°	39°26.6'	+04.7'	74.7°	39°42.1'	+06.0'	75.4°	39°56.8'	+07.3'	76.3°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

54° 306° LHA

Latitude SAME as Declination

54° 306° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

55° 305° LHA

Latitude SAME as Declination

55° 305° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	33°49.0'	+17.1'	99.6°	33°38.6'	+18.3'	100.3°	33°27.6'	+19.5'	100.9°	33°15.9'	+20.7'	101.6°	33°03.5'	+21.8'	102.2°	32°50.5'	+23.0'	102.8°	32°36.9'	+24.1'	103.5°	0
1	34°06.2'	+16.5'	98.5°	33°57.0'	+17.7'	99.1°	33°47.1'	+18.9'	99.8°	33°36.6'	+20.1'	100.4°	33°25.4'	+21.2'	101.1°	33°13.5'	+22.4'	101.7°	33°01.0'	+23.5'	102.4°	1
2	34°22.6'	+15.8'	97.3°	34°14.7'	+17.0'	98.0°	34°06.0'	+18.2'	98.6°	33°56.6'	+19.4'	99.3°	33°46.6'	+20.6'	100.0°	33°35.9'	+21.8'	100.6°	33°24.5'	+22.9'	101.3°	2
3	34°38.5'	+15.2'	96.1°	34°31.7'	+16.4'	96.8°	34°24.3'	+17.6'	97.5°	34°16.1'	+18.8'	98.2°	34°07.2'	+20.0'	98.8°	33°57.6'	+21.2'	99.5°	33°47.4'	+22.3'	100.2°	3
4	34°53.6'	+14.5'	94.9°	34°48.1'	+15.7'	95.6°	34°41.8'	+16.9'	96.3°	34°34.9'	+18.1'	97.0°	34°27.2'	+19.3'	97.7°	34°18.8'	+20.5'	98.4°	34°09.7'	+21.7'	99.0°	4
5	35°08.1'	+13.8'	93.8°	35°03.8'	+15.0'	94.5°	34°58.8'	+16.2'	95.2°	34°53.0'	+17.5'	95.9°	34°46.5'	+18.7'	96.5°	34°39.3'	+19.9'	97.2°	34°31.4'	+21.1'	97.9°	5
6	35°21.9'	+13.1'	92.6°	35°18.8'	+14.3'	93.3°	35°15.0'	+15.6'	94.0°	35°10.5'	+16.8'	94.7°	35°05.2'	+18.0'	95.4°	34°59.2'	+19.2'	96.1°	34°52.5'	+20.4'	96.8°	6
7	35°34.9'	+12.4'	91.4°	35°33.1'	+13.6'	92.1°	35°30.6'	+14.9'	92.8°	35°27.3'	+16.1'	93.5°	35°23.2'	+17.3'	94.2°	35°18.4'	+18.6'	94.9°	35°12.9'	+19.8'	95.6°	7
8	35°47.3'	+11.6'	90.2°	35°46.7'	+12.9'	90.9°	35°45.4'	+14.2'	91.6°	35°43.4'	+15.4'	92.3°	35°40.6'	+16.6'	93.0°	35°37.0'	+17.9'	93.8°	35°32.7'	+19.1'	94.5°	8
9	35°58.9'	+10.9'	89.0°	35°59.6'	+12.2'	89.7°	35°59.6'	+13.4'	90.4°	35°58.8'	+14.7'	91.1°	35°57.2'	+15.9'	91.9°	35°54.9'	+17.2'	92.6°	35°51.8'	+18.4'	93.3°	9
10	36°09.8'	+10.2'	87.7°	36°11.8'	+11.4'	88.5°	36°13.0'	+12.7'	89.2°	36°13.5'	+14.0'	89.9°	36°13.2'	+15.2'	90.7°	36°12.1'	+16.5'	91.4°	36°10.2'	+17.7'	92.1°	10
11	36°20.0'	+09.4'	86.5°	36°23.2'	+10.7'	87.3°	36°25.7'	+12.0'	88.0°	36°27.4'	+13.2'	88.7°	36°28.4'	+14.5'	89.5°	36°28.6'	+15.8'	90.2°	36°28.0'	+17.0'	90.9°	11
12	36°29.4'	+08.6'	85.3°	36°33.9'	+09.9'	86.0°	36°37.7'	+11.2'	86.8°	36°40.7'	+12.5'	87.5°	36°42.9'	+13.8'	88.3°	36°44.3'	+15.0'	89.0°	36°45.0'	+16.3'	89.8°	12
13	36°38.0'	+07.9'	84.1°	36°43.8'	+09.2'	84.8°	36°48.9'	+10.5'	85.5°	36°53.2'	+11.7'	86.3°	36°56.6'	+13.0'	87.0°	36°59.4'	+14.3'	87.8°	37°01.3'	+15.6'	88.5°	13
14	36°45.9'	+07.1'	82.8°	36°53.0'	+08.4'	83.6°	36°59.3'	+09.7'	84.3°	37°04.9'	+11.0'	85.1°	37°09.7'	+12.3'	85.8°	37°13.6'	+13.5'	86.6°	37°16.8'	+14.8'	87.3°	14
15	36°53.0'	+06.3'	81.6°	37°01.4'	+07.6'	82.3°	37°09.0'	+08.9'	83.1°	37°15.9'	+10.2'	83.8°	37°21.9'	+11.5'	84.6°	37°27.2'	+12.8'	85.4°	37°31.6'	+14.1'	86.1°	15
16	36°59.3'	+05.6'	80.3°	37°09.0'	+06.8'	81.1°	37°17.9'	+08.1'	81.8°	37°26.1'	+09.4'	82.6°	37°33.4'	+10.7'	83.4°	37°40.0'	+12.0'	84.1°	37°45.7'	+13.3'	84.9°	16
17	37°04.9'	+04.8'	79.1°	37°15.9'	+06.1'	79.8°	37°26.1'	+07.3'	80.6°	37°35.5'	+08.6'	81.3°	37°44.1'	+09.9'	82.1°	37°52.0'	+11.2'	82.9°	37°59.0'	+12.5'	83.7°	17
18	37°09.7'	+04.0'	77.8°	37°21.9'	+05.3'	78.6°	37°33.4'	+06.5'	79.3°	37°44.1'	+07.8'	80.1°	37°54.0'	+09.1'	80.9°	38°03.2'	+10.4'	81.6°	38°11.5'	+11.7'	82.4°	18
19	37°13.6'	+03.2'	76.6°	37°27.2'	+04.5'	77.3°	37°40.0'	+05.7'	78.1°	37°52.0'	+07.0'	78.8°	38°03.2'	+08.3'	79.6°	38°13.6'	+09.6'	80.4°	38°23.2'	+10.9'	81.2°	19
20	37°16.8'	+02.4'	75.3°	37°31.6'	+03.7'	76.1°	37°45.7'	+04.9'	76.8°	37°59.0'	+06.2'	77.6°	38°11.5'	+07.5'	78.3°	38°23.2'	+08.8'	79.1°	38°34.1'	+10.1'	79.9°	20
21	37°19.2'	+01.6'	74.1°	37°35.3'	+02.9'	74.8°	37°50.6'	+04.1'	75.6°	38°05.2'	+05.4'	76.3°	38°19.0'	+06.7'	77.1°	38°32.0'	+08.0'	77.9°	38°44.3'	+09.3'		

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

56° 304° LHA

Latitude SAME as Declination

56° 304° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	32°51.6'	+17.0'	99.3°	32°41.6'	+18.1'	99.9°	32°30.9'	+19.3'	100.5°	32°19.7'	+20.5'	101.2°	32°07.7'	+21.6'	101.8°	31°55.2'	+22.7'	102.4°	31°42.0'	+23.8'	103.0°	0
1	33°08.5'	+16.3'	98.1°	32°59.7'	+17.5'	98.8°	32°50.3'	+18.7'	99.4°	32°40.1'	+19.9'	100.0°	32°29.3'	+21.0'	100.7°	32°17.9'	+22.2'	101.3°	32°05.8'	+23.3'	101.9°	1
2	33°24.9'	+15.7'	97.0°	33°17.3'	+16.9'	97.6°	33°09.0'	+18.1'	98.3°	33°00.0'	+19.3'	98.9°	32°50.4'	+20.4'	99.6°	32°40.1'	+21.6'	100.2°	32°29.1'	+22.7'	100.8°	2
3	33°40.6'	+15.0'	95.8°	33°34.2'	+16.3'	96.5°	33°27.0'	+17.5'	97.1°	33°19.3'	+18.6'	97.8°	33°10.8'	+19.8'	98.4°	33°01.7'	+21.0'	99.1°	32°51.9'	+22.1'	99.7°	3
4	33°55.6'	+14.4'	94.7°	33°50.4'	+15.6'	95.3°	33°44.5'	+16.8'	96.0°	33°37.9'	+18.0'	96.6°	33°30.6'	+19.2'	97.3°	33°22.6'	+20.4'	98.0°	33°14.0'	+21.5'	98.6°	4
5	34°10.0'	+13.7'	93.5°	34°06.0'	+14.9'	94.2°	34°01.3'	+16.2'	94.8°	33°55.9'	+17.4'	95.5°	33°49.8'	+18.6'	96.2°	33°43.0'	+19.8'	96.8°	33°35.5'	+20.9'	97.5°	5
6	34°23.7'	+13.0'	92.3°	34°20.9'	+14.3'	93.0°	34°17.5'	+15.5'	93.7°	34°13.3'	+16.7'	94.3°	34°08.4'	+17.9'	95.0°	34°02.8'	+19.1'	95.7°	33°56.5'	+20.3'	96.4°	6
7	34°36.7'	+12.3'	91.1°	34°35.2'	+13.6'	91.8°	34°33.0'	+14.8'	92.5°	34°30.0'	+16.0'	93.2°	34°26.3'	+17.3'	93.9°	34°21.9'	+18.5'	94.5°	34°16.8'	+19.7'	95.2°	7
8	34°49.1'	+11.6'	89.9°	34°48.8'	+12.9'	90.6°	34°47.8'	+14.1'	91.3°	34°46.0'	+15.4'	92.0°	34°43.6'	+16.6'	92.7°	34°40.4'	+17.8'	93.4°	34°36.5'	+19.0'	94.1°	8
9	35°00.7'	+10.9'	88.7°	35°01.7'	+12.2'	89.4°	35°01.9'	+13.4'	90.1°	35°01.4'	+14.7'	90.8°	35°00.2'	+15.9'	91.5°	34°58.2'	+17.2'	92.2°	34°55.5'	+18.4'	92.9°	9
10	35°11.6'	+10.2'	87.5°	35°13.9'	+11.5'	88.2°	35°15.4'	+12.7'	88.9°	35°16.1'	+14.0'	89.6°	35°16.1'	+15.2'	90.4°	35°15.4'	+16.5'	91.1°	35°13.9'	+17.7'	91.8°	10
11	35°21.9'	+09.5'	86.3°	35°25.3'	+10.8'	87.0°	35°28.1'	+12.0'	87.7°	35°30.1'	+13.3'	88.5°	35°31.3'	+14.5'	89.2°	35°31.8'	+15.8'	89.9°	35°31.6'	+17.0'	90.6°	11
12	35°31.4'	+08.8'	85.1°	35°36.1'	+10.0'	85.8°	35°40.1'	+11.3'	86.5°	35°43.4'	+12.6'	87.3°	35°45.9'	+13.8'	88.0°	35°47.6'	+15.1'	88.7°	35°48.6'	+16.3'	89.4°	12
13	35°40.1'	+08.0'	83.9°	35°46.1'	+09.3'	84.6°	35°51.4'	+10.6'	85.3°	35°55.9'	+11.8'	86.0°	35°59.7'	+13.1'	86.8°	36°02.7'	+14.4'	87.5°	36°04.9'	+15.6'	88.2°	13
14	35°48.1'	+07.3'	82.7°	35°55.4'	+08.6'	83.4°	36°02.0'	+09.8'	84.1°	36°07.7'	+11.1'	84.8°	36°12.8'	+12.4'	85.6°	36°17.0'	+13.6'	86.3°	36°20.5'	+14.9'	87.0°	14
15	35°55.4'	+06.5'	81.4°	36°04.0'	+07.8'	82.2°	36°11.8'	+09.1'	82.9°	36°18.8'	+10.3'	83.6°	36°25.1'	+11.6'	84.3°	36°30.6'	+12.9'	85.1°	36°35.4'	+14.2'	85.8°	15
16	36°02.0'	+05.8'	80.2°	36°11.8'	+07.1'	80.9°	36°20.9'	+08.3'	81.7°	36°29.2'	+09.6'	82.4°	36°36.7'	+10.9'	83.1°	36°43.5'	+12.1'	83.9°	36°49.6'	+13.4'	84.6°	16
17	36°07.7'	+05.0'	79.0°	36°18.8'	+06.3'	79.7°	36°29.2'	+07.6'	80.4°	36°38.8'	+08.8'	81.2°	36°47.6'	+10.1'	81.9°	36°55.7'	+11.4'	82.6°	37°03.0'	+12.7'	83.4°	17
18	36°12.8'	+04.3'	77.8°	36°25.1'	+05.5'	78.5°	36°36.7'	+06.8'	79.2°	36°47.6'	+08.1'	79.9°	36°57.7'	+09.3'	80.7°	37°07.1'	+10.6'	81.4°	37°15.6'	+11.9'	82.2°	18
19	36°17.0'	+03.5'	76.5°	36°30.6'	+04.8'	77.2°	36°43.5'	+06.0'	78.0°	36°55.7'	+07.3'	78.7°	37°07.1'	+08.6'	79.4°	37°17.7'	+09.8'	80.2°	37°27.5'	+11.1'	80.9°	19
20	36°20.5'	+02.7'	75.3°	36°35.4'	+04.0'	76.0°	36°49.6'	+05.2'	76.7°	37°03.0'	+06.5'	77.4°	37°15.6'	+07.8'	78.2°	37°27.5'	+09.1'	78.9°	37°38.7'	+10.3'	79.7°	20
21	36°23.2'	+02.0'	74.0°	36°39.4'	+03.2'	74.7°	36°54.8'	+04.5'	75.5°	37°09.5'	+05.7'	76.2°	37°23.4'	+07.0'	76.9°	37°36.6'	+08.3'	77.7°	37°49.0'	+09.6'	78.4°	21
22	36°25.2'	+01.2'	72.8°	36°42.6'	+02.4'	73.5°	36°59.3'	+03.7'	74.2°	37°15.2'	+04.9'	75.0°	37°30.4'	+06.2'	75.7°	37°44.9'	+07.5'	76.4°	37°58.6'	+08.8'	77.2°	22
23	36°26.4'	+00.4'	71.6°	36°45.0'	+01.6'	72.3°	37°02.9'	+02.9'	73.0°	37°20.2'	+04.1'	73.7°	37°36.6'	+05.4'	74.4°	37°52.3'	+06.7'	75.2°	38°07.3'	+07.9'	75.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

56° 304° LHA

Latitude SAME as Declination

56° 304° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

57° 303° LHA

Latitude SAME as Declination

57° 303° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	31°54.1'	+16.8'	98.9°	31°44.5'	+18.0'	99.5°	31°34.2'	+19.1'	100.1°	31°23.3'	+20.3'	100.8°	31°11.8'	+21.4'	101.3°	30°59.7'	+22.5'	101.9°	30°47.0'	+23.6'	102.5°	0
1	32°10.9'	+16.2'	97.8°	32°02.4'	+17.4'	98.4°	31°53.3'	+18.5'	99.0°	31°43.6'	+19.7'	99.6°	31°33.2'	+20.8'	100.3°	31°22.2'	+22.0'	100.9°	31°10.6'	+23.1'	101.5°	1
2	32°27.1'	+15.6'	96.7°	32°19.8'	+16.8'	97.3°	32°11.9'	+17.9'	97.9°	32°03.3'	+19.1'	98.5°	31°54.1'	+20.3'	99.2°	31°44.2'	+21.4'	99.8°	31°33.7'	+22.5'	100.4°	2
3	32°42.6'	+14.9'	95.5°	32°36.5'	+16.1'	96.1°	32°29.8'	+17.3'	96.8°	32°22.4'	+18.5'	97.4°	32°14.3'	+19.7'	98.0°	32°05.6'	+20.8'	98.7°	31°56.2'	+22.0'	99.3°	3
4	32°57.6'	+14.3'	94.4°	32°52.7'	+15.5'	95.0°	32°47.1'	+16.7'	95.6°	32°40.9'	+17.9'	96.3°	32°34.0'	+19.1'	96.9°	32°26.4'	+20.2'	97.6°	32°18.2'	+21.4'	98.2°	4
5	33°11.9'	+13.7'	93.2°	33°08.2'	+14.9'	93.9°	33°03.8'	+16.1'	94.5°	32°58.8'	+17.3'	95.1°	32°53.1'	+18.5'	95.8°	32°46.7'	+19.6'	96.4°	32°39.6'	+20.8'	97.1°	5
6	33°25.5'	+13.0'	92.0°	33°23.1'	+14.2'	92.7°	33°19.9'	+15.4'	93.3°	33°16.1'	+16.6'	94.0°	33°11.5'	+17.8'	94.7°	33°06.3'	+19.0'	95.3°	33°00.4'	+20.2'	96.0°	6
7	33°38.5'	+12.3'	90.9°	33°37.3'	+13.6'	91.5°	33°35.3'	+14.8'	92.2°	33°32.7'	+16.0'	92.9°	33°29.4'	+17.2'	93.5°	33°25.3'	+18.4'	94.2°	33°20.6'	+19.6'	94.8°	7
8	33°50.9'	+11.7'	89.7°	33°50.8'	+12.9'	90.4°	33°50.1'	+14.1'	91.0°	33°48.7'	+15.3'	91.7°	33°46.6'	+16.6'	92.4°	33°43.7'	+17.8'	93.0°	33°40.2'	+19.0'	93.7°	8
9	34°02.5'	+11.0'	88.5°	34°03.7'	+12.2'	89.2°	34°04.2'	+13.5'	89.9°	34°04.0'	+14.7'	90.5°	34°03.1'	+15.9'	91.2°	34°01.5'	+17.1'	91.9°	33°59.2'	+18.3'	92.6°	9
10	34°13.5'	+10.3'	87.3°	34°15.9'	+11.5'	88.0°	34°17.7'	+12.8'	88.7°	34°18.7'	+14.0'	89.4°	34°19.0'	+15.2'	90.0°	34°18.6'	+16.5'	90.7°	34°17.5'	+17.7'	91.4°	10
11	34°23.8'	+09.6'	86.1°	34°27.5'	+10.8'	86.8°	34°30.5'	+12.1'	87.5°	34°32.7'	+13.3'	88.2°	34°34.3'	+14.6'	88.9°	34°35.1'	+15.8'	89.6°	34°35.2'	+17.0'	90.2°	11
12	34°33.4'	+08.9'	84.9°	34°38.3'	+10.1'	85.6°	34°42.5'	+11.4'	86.3°	34°46.0'	+12.6'	87.0°	34°48.8'	+13.9'	87.7°	34°50.9'	+15.1'	88.4°	34°52.2'	+16.3'	89.1°	12
13	34°42.2'	+08.2'	83.7°	34°48.4'	+09.4'	84.4°	34°53.9'	+10.7'	85.1°	34°58.7'	+11.9'	85.8°	35°02.7'	+13.2'	86.5°	35°06.0'	+14.4'	87.2°	35°08.6'	+15.7'	87.9°	13
14	34°50.4'	+07.5'	82.5°	34°57.9'	+08.7'	83.2°	35°04.6'	+10.0'	83.9°	35°10.6'	+11.2'	84.6°	35°15.9'	+12.5'	85.3°	35°20.4'	+13.7'	86.0°	35°24.2'	+15.0'	86.7°	14
15	34°57.9'	+06.7'	81.3°	35°06.6'	+08.0'	82.0°	35°14.6'	+09.2'	82.7°	35°21.8'	+10.5'	83.4°	35°28.4'	+11.8'	84.1°	35°34.1'	+13.0'	84.8°	35°39.2'	+14.3'	85.5°	15
16	35°04.6'	+06.0'	80.1°	35°14.6'	+07.3'	80.8°	35°23.8'	+08.5'	81.5°	35°32.3'	+09.8'	82.2°	35°40.1'	+11.0'	82.9°	35°47.1'	+12.3'	83.6°	35°53.4'	+13.5'	84.3°	16
17	35°10.6'	+05.3'	78.9°	35°21.8'	+06.5'	79.6°	35°32.3'	+07.8'	80.3°	35°42.1'	+09.0'	81.0°	35°51.1'	+10.3'	81.7°	35°59.4'	+11.6'	82.4°	36°07.0'	+12.8'	83.1°	17
18	35°15.9'	+04.5'	77.7°	35°28.4'	+05.8'	78.4°	35°40.1'	+07.0'	79.1°	35°51.1'	+08.3'	79.8°	36°01.4'	+09.6'	80.5°	36°11.0'	+10.8'	81.2°	36°19.8'	+12.1'	81.9°	18
19	35°20.4'	+03.8'	76.4°	35°34.1'	+05.0'	77.1°	35°47.1'	+06.3'	77.8°	35°59.4'	+07.6'	78.5°	36°11.0'	+08.8'	79.3°	36°21.8'	+10.1'	80.0°	36°31.9'	+11.3'	80.7°	19
20	35°24.2'	+03.1'	75.2°	35°39.2'	+04.3'	75.9°	35°53.4'	+05.5'	76.6°	36°07.0'	+06.8'	77.3°	36°19.8'	+08.1'	78.0°	36°31.9'	+09.3'	78.7°	36°43.2'	+10.6'	79.5°	20
21	35°27.3'	+02.3'	74.0°	35°43.5'	+03.5'	74.7°	35°59.0'	+04.8'	75.4°	36°13.8'	+06.0'	76.1°	36°27.9'	+07.3'	76.8°	36°41.2'	+08.6'	77.5°	36°53.8'	+09.8'	78.3°	

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

58° 302° LHA

Latitude SAME as Declination

58° 302° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	30°56.6'	+16.6'	98.6°	30°47.3'	+17.8'	99.2°	30°37.4'	+18.9'	99.8°	30°26.9'	+20.1'	100.4°	30°15.8'	+21.2'	100.9°	30°04.2'	+22.3'	101.5°	29°51.9'	+23.4'	102.1°	0
1	31°13.2'	+16.0'	97.5°	31°05.1'	+17.2'	98.1°	30°56.3'	+18.4'	98.7°	30°47.0'	+19.5'	99.3°	30°37.0'	+20.7'	99.8°	30°26.5'	+21.8'	100.4°	30°15.3'	+22.9'	101.0°	1
2	31°29.2'	+15.4'	96.3°	31°22.3'	+16.6'	97.0°	31°14.7'	+17.8'	97.6°	31°06.5'	+19.0'	98.2°	30°57.7'	+20.1'	98.8°	30°48.3'	+21.2'	99.3°	30°38.2'	+22.4'	99.9°	2
3	31°44.7'	+14.8'	95.2°	31°38.9'	+16.0'	95.8°	31°32.5'	+17.2'	96.4°	31°25.5'	+18.4'	97.0°	31°17.8'	+19.5'	97.7°	31°09.5'	+20.7'	98.3°	31°00.6'	+21.8'	98.8°	3
4	31°59.5'	+14.2'	94.1°	31°54.9'	+15.4'	94.7°	31°49.7'	+16.6'	95.3°	31°43.8'	+17.8'	95.9°	31°37.3'	+19.0'	96.5°	31°30.2'	+20.1'	97.2°	31°22.4'	+21.3'	97.8°	4
5	32°13.7'	+13.6'	92.9°	32°10.4'	+14.8'	93.6°	32°06.3'	+16.0'	94.2°	32°01.6'	+17.2'	94.8°	31°56.3'	+18.4'	95.4°	31°50.3'	+19.5'	96.0°	31°43.6'	+20.7'	96.7°	5
6	32°27.4'	+13.0'	91.8°	32°25.2'	+14.2'	92.4°	32°22.3'	+15.4'	93.0°	32°18.8'	+16.6'	93.7°	32°14.6'	+17.8'	94.3°	32°09.8'	+18.9'	94.9°	32°04.3'	+20.1'	95.6°	6
7	32°40.3'	+12.3'	90.6°	32°39.3'	+13.5'	91.3°	32°37.7'	+14.8'	91.9°	32°35.4'	+16.0'	92.5°	32°32.4'	+17.2'	93.2°	32°28.7'	+18.3'	93.8°	32°24.4'	+19.5'	94.4°	7
8	32°52.6'	+11.7'	89.4°	32°52.9'	+12.9'	90.1°	32°52.4'	+14.1'	90.7°	32°51.3'	+15.3'	91.4°	32°49.5'	+16.5'	92.0°	32°47.1'	+17.7'	92.7°	32°43.9'	+18.9'	93.3°	8
9	33°04.3'	+11.0'	88.3°	33°05.8'	+12.2'	88.9°	33°06.6'	+13.5'	89.6°	33°06.7'	+14.7'	90.2°	33°06.1'	+15.9'	90.9°	33°04.8'	+17.1'	91.5°	33°02.9'	+18.3'	92.2°	9
10	33°15.3'	+10.4'	87.1°	33°18.0'	+11.6'	87.8°	33°20.0'	+12.8'	88.4°	33°21.3'	+14.0'	89.1°	33°22.0'	+15.3'	89.7°	33°21.9'	+16.5'	90.4°	33°21.1'	+17.7'	91.1°	10
11	33°25.7'	+09.7'	85.9°	33°29.6'	+10.9'	86.6°	33°32.8'	+12.1'	87.2°	33°35.4'	+13.4'	87.9°	33°37.2'	+14.6'	88.6°	33°38.4'	+15.8'	89.2°	33°38.8'	+17.0'	89.9°	11
12	33°35.4'	+09.0'	84.7°	33°40.5'	+10.2'	85.4°	33°45.0'	+11.5'	86.1°	33°48.8'	+12.7'	86.7°	33°51.8'	+13.9'	87.4°	33°54.2'	+15.2'	88.1°	33°55.8'	+16.4'	88.8°	12
13	33°44.4'	+08.3'	83.6°	33°50.8'	+09.6'	84.2°	33°56.5'	+10.8'	84.9°	34°01.5'	+12.0'	85.6°	34°05.8'	+13.3'	86.2°	34°09.3'	+14.5'	86.9°	34°12.2'	+15.7'	87.6°	13
14	33°52.7'	+07.6'	82.4°	34°00.3'	+08.9'	83.0°	34°07.3'	+10.1'	83.7°	34°13.5'	+11.3'	84.4°	34°19.0'	+12.6'	85.1°	34°23.8'	+13.8'	85.7°	34°27.9'	+15.0'	86.4°	14
15	34°00.3'	+06.9'	81.2°	34°09.2'	+08.2'	81.8°	34°17.4'	+09.4'	82.5°	34°24.8'	+10.7'	83.2°	34°31.6'	+11.9'	83.9°	34°37.7'	+13.1'	84.6°	34°43.0'	+14.4'	85.2°	15
16	34°07.3'	+06.2'	80.0°	34°17.4'	+07.5'	80.6°	34°26.8'	+08.7'	81.3°	34°35.5'	+10.0'	82.0°	34°43.5'	+11.2'	82.7°	34°50.8'	+12.4'	83.4°	34°57.3'	+13.7'	84.1°	16
17	34°13.5'	+05.5'	78.8°	34°24.8'	+06.8'	79.4°	34°35.5'	+08.0'	80.1°	34°45.4'	+09.2'	80.8°	34°54.7'	+10.5'	81.5°	35°03.2'	+11.7'	82.2°	35°11.0'	+13.0'	82.9°	17
18	34°19.0'	+04.8'	77.6°	34°31.6'	+06.1'	78.2°	34°43.5'	+07.3'	78.9°	34°54.7'	+08.5'	79.6°	35°05.2'	+09.8'	80.3°	35°14.9'	+11.0'	81.0°	35°24.0'	+12.3'	81.7°	18
19	34°23.8'	+04.1'	76.4°	34°37.7'	+05.3'	77.0°	34°50.8'	+06.6'	77.7°	35°03.2'	+07.8'	78.4°	35°14.9'	+09.0'	79.1°	35°26.0'	+10.3'	79.8°	35°36.3'	+11.5'	80.5°	19
20	34°27.9'	+03.4'	75.1°	34°43.0'	+04.6'	75.8°	34°57.3'	+05.8'	76.5°	35°11.0'	+07.1'	77.2°	35°24.0'	+08.3'	77.9°	35°36.3'	+09.6'	78.6°	35°47.8'	+10.8'	79.3°	20
21	34°31.3'	+02.7'	73.9°	34°47.6'	+03.9'	74.6°	35°03.2'	+05.1'	75.3°	35°18.1'	+06.3'	76.0°	35°32.3'	+07.6'	76.6°	35°45.8'	+08.8'	77.3°	35°58.6'	+10.1'	78.1°	21
22	34°34.0'	+01.9'	72.7°	34°51.5'	+03.2'	73.4°	35°08.3'	+04.4'	74.1°	35°24.5'	+05.6'	74.7°	35°39.9'	+06.8'	75.4°	35°54.6'	+08.1'	76.1°	36°08.7'	+09.3'	76.8°	22
23	34°35.9'	+01.2'	71.5°	34°54.6'	+02.4'	72.2°	35°12.7'	+03.6'	72.8°	35°30.1'	+04.9'	73.5°	35°46.7'	+06.1'	74.2°	36°02.7'	+07.3'	74.9°	36°18.0'	+08.6'	75.6°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

58° 302° LHA

Latitude SAME as Declination

58° 302° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

59° 301° LHA

Latitude SAME as Declination

59° 301° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	29°59.0'	+16.5'	98.3°	29°50.0'	+17.6'	98.8°	29°40.5'	+18.8'	99.4°	29°30.4'	+19.9'	100.0°	29°19.8'	+21.0'	100.5°	29°08.5'	+22.1'	101.1°	28°56.7'	+23.2'	101.6°	0
1	30°15.4'	+15.9'	97.2°	30°07.7'	+17.1'	97.7°	29°59.3'	+18.2'	98.3°	29°50.3'	+19.4'	98.9°	29°40.8'	+20.5'	99.4°	29°30.6'	+21.6'	100.0°	29°19.9'	+22.7'	100.6°	1
2	30°31.4'	+15.3'	96.0°	30°24.7'	+16.5'	96.6°	30°17.5'	+17.7'	97.2°	30°09.7'	+18.8'	97.8°	30°01.3'	+19.9'	98.4°	29°52.2'	+21.1'	98.9°	29°42.6'	+22.2'	99.5°	2
3	30°46.7'	+14.8'	94.9°	30°41.2'	+15.9'	95.5°	30°35.2'	+17.1'	96.1°	30°28.5'	+18.3'	96.7°	30°21.2'	+19.4'	97.3°	30°13.3'	+20.5'	97.8°	30°04.8'	+21.7'	98.4°	3
4	31°01.4'	+14.2'	93.8°	30°57.2'	+15.3'	94.4°	30°52.3'	+16.5'	95.0°	30°46.7'	+17.7'	95.6°	30°40.4'	+18.8'	96.2°	30°33.8'	+20.0'	96.8°	30°26.5'	+21.1'	97.3°	4
5	31°15.6'	+13.6'	92.7°	31°12.5'	+14.7'	93.3°	31°08.8'	+15.9'	93.9°	31°04.4'	+17.1'	94.5°	30°59.4'	+18.3'	95.1°	30°53.8'	+19.4'	95.7°	30°47.6'	+20.6'	96.3°	5
6	31°29.2'	+12.9'	91.5°	31°27.3'	+14.1'	92.1°	31°24.7'	+15.3'	92.7°	31°21.5'	+16.5'	93.3°	31°17.7'	+17.7'	94.0°	31°13.3'	+18.9'	94.6°	31°08.2'	+20.0'	95.2°	6
7	31°42.1'	+12.3'	90.4°	31°41.4'	+13.5'	91.0°	31°40.0'	+14.7'	91.6°	31°38.0'	+15.9'	92.2°	31°35.4'	+17.1'	92.8°	31°32.1'	+18.3'	93.4°	31°28.2'	+19.4'	94.1°	7
8	31°54.4'	+11.7'	89.2°	31°54.9'	+12.9'	89.8°	31°54.8'	+14.1'	90.5°	31°54.0'	+15.3'	91.1°	31°52.5'	+16.5'	91.7°	31°50.4'	+17.7'	92.3°	31°47.6'	+18.9'	92.9°	8
9	32°06.1'	+11.1'	88.1°	32°07.8'	+12.3'	88.7°	32°08.9'	+13.5'	89.3°	32°09.3'	+14.7'	89.9°	32°09.0'	+15.9'	90.6°	32°08.1'	+17.1'	91.2°	32°06.5'	+18.3'	91.8°	9
10	32°17.2'	+10.4'	86.9°	32°20.1'	+11.6'	87.5°	32°22.4'	+12.9'	88.2°	32°24.0'	+14.1'	88.8°	32°24.9'	+15.3'	89.4°	32°25.2'	+16.5'	90.1°	32°24.8'	+17.7'	90.7°	10
11	32°27.6'	+09.8'	85.7°	32°31.8'	+11.0'	86.4°	32°35.2'	+12.2'	87.0°	32°38.0'	+13.4'	87.6°	32°40.2'	+14.6'	88.3°	32°41.6'	+15.8'	88.9°	32°42.4'	+17.0'	89.6°	11
12	32°37.4'	+09.1'	84.6°	32°42.8'	+10.4'	85.2°	32°47.5'	+11.6'	85.8°	32°51.5'	+12.8'	86.5°	32°54.8'	+14.0'	87.1°	32°57.5'	+15.2'	87.8°	32°59.5'	+16.4'	88.4°	12
13	32°46.5'	+08.5'	83.4°	32°53.1'	+09.7'	84.0°	32°59.0'	+10.9'	84.7°	33°04.3'	+12.1'	85.3°	33°08.8'	+13.4'	86.0°	33°12.7'	+14.6'	86.6°	33°15.9'	+15.8'	87.3°	13
14	32°55.0'	+07.8'	82.2°	33°02.8'	+09.0'	82.8°	33°09.9'	+10.3'	83.5°	33°16.4'	+11.5'	84.1°	33°22.2'	+12.7'	84.8°	33°27.3'	+13.9'	85.5°	33°31.7'	+15.1'	86.1°	14
15	33°02.8'	+07.1'	81.0°	33°11.8'	+08.4'	81.7°	33°20.2'	+09.6'	82.3°	33°27.9'	+10.8'	83.0°	33°34.9'	+12.0'	83.6°	33°41.2'	+13.3'	84.3°	33°46.8'	+14.5'	85.0°	15
16	33°09.9'	+06.5'	79.8°	33°20.2'	+07.7'	80.5°	33°29.8'	+08.9'	81.1°	33°38.7'	+10.1'	81.8°	33°46.9'	+11.4'	82.5°	33°54.4'	+12.6'	83.1°	34°01.3'	+13.8'	83.8°	16
17	33°16.4'	+05.8'	78.7°	33°27.9'	+07.0'	79.3°	33°38.7'	+08.2'	79.9°	33°48.8'	+09.4'	80.6°	33°58.3'	+10.7'	81.3°	34°07.0'	+11.9'	81.9°	34°15.1'	+13.1'	82.6°	17
18	33°22.2'	+05.1'	77.5°	33°34.9'	+06.3'	78.1°	33°46.9'	+07.5'	78.8°	33°58.3'	+08.8'	79.4°	34°08.9'	+10.0'	80.1°	34°18.9'	+11.2'	80.8°	34°28.2'	+12.4'	81.4°	18
19	33°27.3'	+04.4'	76.3°	33°41.2'	+05.6'	76.9°	33°54.4'	+06.8'	77.6°	34°07.0'	+08.1'	78.2°	34°18.9'	+09.3'	78.9°	34°30.1'	+10.5'	79.6°	34°40.7'	+11.7'	80.2°	19
20	33°31.7'	+03.7'	75.1°	33°46.8'	+04.9'	75.7°	34°01.3'	+06.1'	76.4°	34°15.1'	+07.4'	77.0°	34°28.2'	+08.6'	77.7°	34°40.7'	+09.8'	78.4°	34°52.4'	+11.0'	79.0°	20
21	33°35.4'	+03.0'	73.9°	33°51.7'	+04.2'	74.5°	34°07.4'	+05.4'	75.2°	34°22.5'	+06.7'	75.8°	34°36.8'	+07.9'	76.5°	34°50.5'	+09.1'	77.2°	35°03.5'	+10.3'	77.8°	21
22	33°38.4'	+02.3'	72.7°	33°56																		

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

60° 300° LHA

Latitude SAME as Declination

60° 300° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	29°01.3'	+16.3'	98.0°	28°52.7'	+17.5'	98.5°	28°43.6'	+18.6'	99.0°	28°33.9'	+19.7'	99.6°	28°23.6'	+20.8'	100.1°	28°12.8'	+21.9'	100.6°	28°01.5'	+23.0'	101.2°	0
1	29°17.7'	+15.8'	96.8°	29°10.2'	+16.9'	97.4°	29°02.2'	+18.1'	98.0°	28°53.6'	+19.2'	98.5°	28°44.5'	+20.3'	99.0°	28°34.7'	+21.4'	99.6°	28°24.5'	+22.5'	100.1°	1
2	29°33.4'	+15.2'	95.7°	29°27.1'	+16.4'	96.3°	29°20.3'	+17.5'	96.9°	29°12.8'	+18.7'	97.4°	29°04.8'	+19.8'	98.0°	28°56.2'	+20.9'	98.5°	28°47.0'	+22.0'	99.1°	2
3	29°48.7'	+14.7'	94.6°	29°43.5'	+15.8'	95.2°	29°37.8'	+17.0'	95.8°	29°31.5'	+18.1'	96.3°	29°24.6'	+19.3'	96.9°	29°17.1'	+20.4'	97.4°	29°09.0'	+21.5'	98.0°	3
4	30°03.3'	+14.1'	93.5°	29°59.4'	+15.3'	94.1°	29°54.8'	+16.4'	94.7°	29°49.6'	+17.6'	95.2°	29°43.8'	+18.7'	95.8°	29°37.5'	+19.9'	96.4°	29°30.5'	+21.0'	96.9°	4
5	30°17.4'	+13.5'	92.4°	30°14.6'	+14.7'	93.0°	30°11.2'	+15.9'	93.5°	30°07.2'	+17.0'	94.1°	30°02.6'	+18.2'	94.7°	29°57.4'	+19.3'	95.3°	29°51.5'	+20.5'	95.9°	5
6	30°31.0'	+12.9'	91.3°	30°29.3'	+14.1'	91.8°	30°27.1'	+15.3'	92.4°	30°24.2'	+16.5'	93.0°	30°20.8'	+17.6'	93.6°	30°16.7'	+18.8'	94.2°	30°12.0'	+19.9'	94.8°	6
7	30°43.9'	+12.3'	90.1°	30°43.4'	+13.5'	90.7°	30°42.4'	+14.7'	91.3°	30°40.7'	+15.9'	91.9°	30°38.4'	+17.1'	92.5°	30°35.5'	+18.2'	93.1°	30°31.9'	+19.4'	93.7°	7
8	30°56.2'	+11.7'	89.0°	30°57.0'	+12.9'	89.6°	30°57.1'	+14.1'	90.2°	30°56.6'	+15.3'	90.8°	30°55.5'	+16.5'	91.4°	30°53.7'	+17.7'	92.0°	30°51.3'	+18.8'	92.6°	8
9	31°08.0'	+11.1'	87.8°	31°09.9'	+12.3'	88.4°	31°11.2'	+13.5'	89.0°	31°11.9'	+14.7'	89.7°	31°12.0'	+15.9'	90.3°	31°11.4'	+17.1'	90.9°	31°10.1'	+18.2'	91.5°	9
10	31°19.1'	+10.5'	86.7°	31°22.2'	+11.7'	87.3°	31°24.7'	+12.9'	87.9°	31°26.6'	+14.1'	88.5°	31°27.8'	+15.3'	89.1°	31°28.4'	+16.5'	89.7°	31°28.4'	+17.7'	90.4°	10
11	31°29.6'	+09.9'	85.5°	31°33.9'	+11.1'	86.1°	31°37.6'	+12.3'	86.8°	31°40.7'	+13.5'	87.4°	31°43.1'	+14.7'	88.0°	31°44.9'	+15.9'	88.6°	31°46.1'	+17.1'	89.2°	11
12	31°39.5'	+09.3'	84.4°	31°45.0'	+10.5'	85.0°	31°49.9'	+11.7'	85.6°	31°54.2'	+12.9'	86.2°	31°57.8'	+14.1'	86.9°	32°00.8'	+15.3'	87.5°	32°03.1'	+16.5'	88.1°	12
13	31°48.7'	+08.6'	83.2°	31°55.5'	+09.8'	83.8°	32°01.6'	+11.0'	84.5°	32°07.1'	+12.2'	85.1°	32°11.9'	+13.5'	85.7°	32°16.1'	+14.7'	86.3°	32°19.6'	+15.8'	87.0°	13
14	31°57.3'	+08.0'	82.0°	32°05.3'	+09.2'	82.7°	32°12.7'	+10.4'	83.3°	32°19.3'	+11.6'	83.9°	32°25.4'	+12.8'	84.6°	32°30.7'	+14.0'	85.2°	32°35.4'	+15.2'	85.8°	14
15	32°05.3'	+07.3'	80.9°	32°14.5'	+08.5'	81.5°	32°23.1'	+09.8'	82.1°	32°30.9'	+11.0'	82.8°	32°38.2'	+12.2'	83.4°	32°44.8'	+13.4'	84.0°	32°50.7'	+14.6'	84.7°	15
16	32°12.7'	+06.7'	79.7°	32°23.1'	+07.9'	80.3°	32°32.8'	+09.1'	81.0°	32°41.9'	+10.3'	81.6°	32°50.4'	+11.5'	82.2°	32°58.1'	+12.7'	82.9°	33°05.2'	+13.9'	83.5°	16
17	32°19.3'	+06.0'	78.5°	32°30.9'	+07.2'	79.2°	32°41.9'	+08.4'	79.8°	32°52.2'	+09.7'	80.4°	33°01.9'	+10.9'	81.1°	33°10.9'	+12.1'	81.7°	33°19.2'	+13.3'	82.4°	17
18	32°25.4'	+05.4'	77.4°	32°38.2'	+06.6'	78.0°	32°50.4'	+07.8'	78.6°	33°01.9'	+09.0'	79.2°	33°12.7'	+10.2'	79.9°	33°23.0'	+11.4'	80.5°	33°32.5'	+12.6'	81.2°	18
19	32°30.7'	+04.7'	76.2°	32°44.8'	+05.9'	76.8°	32°58.1'	+07.1'	77.4°	33°10.9'	+08.3'	78.1°	33°23.0'	+09.5'	78.7°	33°34.4'	+10.7'	79.4°	33°45.1'	+12.0'	80.0°	19
20	32°35.4'	+04.0'	75.0°	32°50.7'	+05.2'	75.6°	33°05.2'	+06.4'	76.2°	33°19.2'	+07.6'	76.9°	33°32.5'	+08.9'	77.5°	33°45.1'	+10.1'	78.2°	33°57.1'	+11.3'	78.8°	20
21	32°39.5'	+03.4'	73.8°	32°55.9'	+04.6'	74.4°	33°11.7'	+05.8'	75.1°	33°26.8'	+07.0'	75.7°	33°41.3'	+08.2'	76.3°	33°55.2'	+09.4'	77.0°	34°08.4'	+10.6'	77.6°	21
22	32°42.8'	+02.7'	72.6°	33°00.5'	+03.9'	73.2°	33°17.4'	+05.1'	73.9°	33°33.8'	+06.3'	74.5°	33°49.5'	+07.5'	75.1°	34°04.6'	+08.7'	75.8°	34°19.0'	+09.9'	76.5°	22
23	32°45.5'	+02.0'	71.4°	33°04.3'	+03.2'	72.0°	33°22.5'	+04.4'	72.7°	33°40.1'	+05.6'	73.3°	33°57.0'	+06.8'	73.9°	34°13.3'	+08.0'	74.6°	34°28.9'	+09.2'	75.3°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

60° 300° LHA

Latitude SAME as Declination

60° 300° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

61° 299° LHA

Latitude SAME as Declination

61° 299° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	28°03.6'	+16.2'	97.6°	27°55.4'	+17.3'	98.2°	27°46.6'	+18.4'	98.7°	27°37.3'	+19.6'	99.2°	27°27.4'	+20.7'	99.7°	27°17.0'	+21.7'	100.2°	27°06.1'	+22.8'	100.7°	0
1	28°19.8'	+15.7'	96.5°	28°12.7'	+16.8'	97.1°	28°05.1'	+17.9'	97.6°	27°56.8'	+19.1'	98.1°	27°48.1'	+20.2'	98.7°	27°38.8'	+21.3'	99.2°	27°28.9'	+22.4'	99.7°	1
2	28°35.5'	+15.1'	95.4°	28°29.5'	+16.3'	96.0°	28°23.0'	+17.4'	96.5°	28°15.9'	+18.5'	97.1°	28°08.2'	+19.7'	97.6°	28°00.0'	+20.8'	98.1°	27°51.3'	+21.9'	98.6°	2
3	28°50.6'	+14.6'	94.3°	28°45.8'	+15.7'	94.9°	28°40.4'	+16.9'	95.4°	28°34.4'	+18.0'	96.0°	28°27.9'	+19.2'	96.5°	28°20.8'	+20.3'	97.1°	28°13.2'	+21.4'	97.6°	3
4	29°05.2'	+14.0'	93.2°	29°01.5'	+15.2'	93.8°	28°57.3'	+16.4'	94.3°	28°52.5'	+17.5'	94.9°	28°47.1'	+18.6'	95.4°	28°41.1'	+19.8'	96.0°	28°34.5'	+20.9'	96.5°	4
5	29°19.3'	+13.5'	92.1°	29°16.8'	+14.7'	92.7°	29°13.7'	+15.8'	93.2°	29°10.0'	+17.0'	93.8°	29°05.7'	+18.1'	94.4°	29°00.9'	+19.2'	94.9°	28°55.4'	+20.4'	95.5°	5
6	29°32.7'	+12.9'	91.0°	29°31.4'	+14.1'	91.6°	29°29.5'	+15.3'	92.1°	29°26.9'	+16.4'	92.7°	29°23.8'	+17.6'	93.3°	29°20.1'	+18.7'	93.8°	29°15.8'	+19.9'	94.4°	6
7	29°45.7'	+12.3'	89.9°	29°45.5'	+13.5'	90.5°	29°44.7'	+14.7'	91.0°	29°43.4'	+15.9'	91.6°	29°41.4'	+17.0'	92.2°	29°38.8'	+18.2'	92.7°	29°35.7'	+19.3'	93.3°	7
8	29°58.0'	+11.8'	88.8°	29°59.0'	+13.0'	89.3°	29°59.4'	+14.1'	89.9°	29°59.2'	+15.3'	90.5°	29°58.4'	+16.5'	91.1°	29°57.0'	+17.6'	91.6°	29°55.0'	+18.8'	92.2°	8
9	30°09.8'	+11.2'	87.6°	30°12.0'	+12.4'	88.2°	30°13.6'	+13.6'	88.8°	30°14.5'	+14.7'	89.4°	30°14.9'	+15.9'	89.9°	30°14.6'	+17.1'	90.5°	30°13.8'	+18.2'	91.1°	9
10	30°21.0'	+10.6'	86.5°	30°24.3'	+11.8'	87.1°	30°27.1'	+13.0'	87.7°	30°29.3'	+14.2'	88.2°	30°30.8'	+15.3'	88.8°	30°31.7'	+16.5'	89.4°	30°32.0'	+17.7'	90.0°	10
11	30°31.6'	+10.0'	85.3°	30°36.1'	+11.2'	85.9°	30°40.1'	+12.4'	86.5°	30°43.4'	+13.6'	87.1°	30°46.1'	+14.7'	87.7°	30°48.2'	+15.9'	88.3°	30°49.7'	+17.1'	88.9°	11
12	30°41.5'	+09.4'	84.2°	30°47.3'	+10.6'	84.8°	30°52.4'	+11.8'	85.4°	30°57.0'	+13.0'	86.0°	31°00.9'	+14.2'	86.6°	31°04.1'	+15.3'	87.2°	31°06.8'	+16.5'	87.8°	12
13	30°50.9'	+08.8'	83.0°	30°57.9'	+10.0'	83.6°	31°04.2'	+11.2'	84.2°	31°09.9'	+12.4'	84.8°	31°15.0'	+13.6'	85.4°	31°19.5'	+14.7'	86.0°	31°23.3'	+15.9'	86.7°	13
14	30°59.7'	+08.2'	81.9°	31°07.8'	+09.4'	82.5°	31°15.4'	+10.5'	83.1°	31°22.3'	+11.7'	83.7°	31°28.6'	+12.9'	84.3°	31°34.2'	+14.1'	84.9°	31°39.2'	+15.3'	85.5°	14
15	31°07.8'	+07.5'	80.7°	31°17.2'	+08.7'	81.3°	31°25.9'	+09.9'	81.9°	31°34.0'	+11.1'	82.5°	31°41.5'	+12.3'	83.2°	31°48.3'	+13.5'	83.8°	31°54.5'	+14.7'	84.4°	15
16	31°15.4'	+06.9'	79.6°	31°25.9'	+08.1'	80.2°	31°35.9'	+09.3'	80.8°	31°45.2'	+10.5'	81.4°	31°53.8'	+11.7'	82.0°	32°01.9'	+12.9'	82.6°	32°09.2'	+14.1'	83.2°	16
17	31°22.3'	+06.3'	78.4°	31°34.0'	+07.5'	79.0°	31°45.2'	+08.7'	79.6°	31°55.7'	+09.9'	80.2°	32°05.5'	+11.1'	80.8°	32°14.8'	+12.3'	81.5°	32°23.3'	+13.5'	82.1°	17
18	31°28.6'	+05.6'	77.2°	31°41.5'	+06.8'	77.8°	31°53.8'	+08.0'	78.5°	32°05.5'	+09.2'	79.1°	32°16.6'	+10.4'	79.7°	32°27.0'	+11.6'	80.3°	32°36.8'	+12.8'	80.9°	18
19	31°34.2'	+05.0'	76.1°	31°48.3'	+06.2'	76.7°	32°01.9'	+07.4'	77.3°	32°14.8'	+08.6'	77.9°	32°27.0'	+09.8'	78.5°	32°38.6'	+11.0'	79.1°	32°49.6'	+12.2'	79.8°	19
20	31°39.2'	+04.4'	74.9°	31°54.5'	+05.5'	75.5°	32°09.2'	+06.7'	76.1°	32°23.3'	+07.9'	76.7°	32°36.8'	+09.1'	77.3°	32°49.6'	+10.3'	78.0°	33°01.8'	+11.5'	78.6°	20
21	31°43.6'	+03.7'	73.7°	32°00.1'	+04.9'	74.3°	32°16.0'	+06.1'	74.9°	32°31.3'	+07.3'	75.6°	32°45.9'	+08.5'	76.2°	33°00.0'	+09.7'	76.8°	33°13.3'	+10.9'	77.4°	21

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

62° 298° LHA

Latitude SAME as Declination

62° 298° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	27°05.9'	+16.1'	97.3°	26°58.0'	+17.2'	97.8°	26°49.6'	+18.3'	98.3°	26°40.6'	+19.4'	98.8°	26°31.1'	+20.5'	99.3°	26°21.2'	+21.6'	99.8°	26°10.7'	+22.6'	100.3°	0
1	27°22.0'	+15.6'	96.2°	27°15.2'	+16.7'	96.8°	27°07.9'	+17.8'	97.3°	27°00.0'	+18.9'	97.8°	26°51.6'	+20.0'	98.3°	26°42.7'	+21.1'	98.8°	26°33.3'	+22.2'	99.3°	1
2	27°37.5'	+15.0'	95.2°	27°31.9'	+16.2'	95.7°	27°25.7'	+17.3'	96.2°	27°18.9'	+18.4'	96.7°	27°11.6'	+19.5'	97.2°	27°03.8'	+20.6'	97.7°	26°55.5'	+21.7'	98.2°	2
3	27°52.6'	+14.5'	94.1°	27°48.0'	+15.7'	94.6°	27°43.0'	+16.8'	95.1°	27°37.4'	+17.9'	95.6°	27°31.2'	+19.1'	96.2°	27°24.5'	+20.2'	96.7°	27°17.2'	+21.3'	97.2°	3
4	28°07.1'	+14.0'	93.0°	28°03.7'	+15.1'	93.5°	27°59.8'	+16.3'	94.0°	27°55.3'	+17.4'	94.6°	27°50.2'	+18.6'	95.1°	27°44.6'	+19.7'	95.6°	27°38.5'	+20.8'	96.1°	4
5	28°21.1'	+13.5'	91.9°	28°18.9'	+14.6'	92.4°	28°16.1'	+15.8'	92.9°	28°12.7'	+16.9'	93.5°	28°08.8'	+18.0'	94.0°	28°04.3'	+19.2'	94.5°	27°59.3'	+20.3'	95.1°	5
6	28°34.5'	+12.9'	90.8°	28°33.5'	+14.1'	91.3°	28°31.8'	+15.2'	91.8°	28°29.6'	+16.4'	92.4°	28°26.8'	+17.5'	92.9°	28°23.5'	+18.7'	93.5°	28°19.6'	+19.8'	94.0°	6
7	28°47.5'	+12.4'	89.6°	28°47.5'	+13.5'	90.2°	28°47.1'	+14.7'	90.7°	28°46.0'	+15.8'	91.3°	28°44.4'	+17.0'	91.8°	28°42.2'	+18.1'	92.4°	28°39.4'	+19.3'	92.9°	7
8	28°59.8'	+11.8'	88.5°	29°01.1'	+13.0'	89.1°	29°01.7'	+14.1'	89.6°	29°01.8'	+15.3'	90.2°	29°01.4'	+16.5'	90.7°	29°00.3'	+17.6'	91.3°	28°58.6'	+18.8'	91.8°	8
9	29°11.6'	+11.2'	87.4°	29°14.0'	+12.4'	88.0°	29°15.9'	+13.6'	88.5°	29°17.2'	+14.8'	89.1°	29°17.8'	+15.9'	89.6°	29°17.9'	+17.1'	90.2°	29°17.4'	+18.2'	90.8°	9
10	29°22.9'	+10.7'	86.3°	29°26.5'	+11.9'	86.8°	29°29.5'	+13.0'	87.4°	29°31.9'	+14.2'	88.0°	29°33.7'	+15.4'	88.5°	29°35.0'	+16.5'	89.1°	29°35.6'	+17.7'	89.7°	10
11	29°33.5'	+10.1'	85.1°	29°38.3'	+11.3'	85.7°	29°42.5'	+12.5'	86.3°	29°46.1'	+13.6'	86.8°	29°49.1'	+14.8'	87.4°	29°51.5'	+16.0'	88.0°	29°53.3'	+17.1'	88.6°	11
12	29°43.6'	+09.5'	84.0°	29°49.6'	+10.7'	84.6°	29°55.0'	+11.9'	85.2°	29°59.7'	+13.1'	85.7°	30°03.9'	+14.2'	86.3°	30°07.5'	+15.4'	86.9°	30°10.4'	+16.6'	87.5°	12
13	29°53.1'	+08.9'	82.9°	30°00.3'	+10.1'	83.4°	30°06.8'	+11.3'	84.0°	30°12.8'	+12.5'	84.6°	30°18.1'	+13.7'	85.2°	30°22.9'	+14.8'	85.8°	30°27.0'	+16.0'	86.3°	13
14	30°02.1'	+08.3'	81.7°	30°10.4'	+09.5'	82.3°	30°18.1'	+10.7'	82.9°	30°25.3'	+11.9'	83.5°	30°31.8'	+13.1'	84.0°	30°37.7'	+14.2'	84.6°	30°43.0'	+15.4'	85.2°	14
15	30°10.4'	+07.7'	80.6°	30°19.9'	+08.9'	81.2°	30°28.8'	+10.1'	81.7°	30°37.2'	+11.3'	82.3°	30°44.9'	+12.5'	82.9°	30°52.0'	+13.7'	83.5°	30°58.4'	+14.8'	84.1°	15
16	30°18.1'	+07.1'	79.4°	30°28.8'	+08.3'	80.0°	30°38.9'	+09.5'	80.6°	30°48.4'	+10.7'	81.2°	30°57.3'	+11.9'	81.8°	31°05.6'	+13.1'	82.4°	31°13.3'	+14.2'	83.0°	16
17	30°25.3'	+06.5'	78.3°	30°37.2'	+07.7'	78.9°	30°48.4'	+08.9'	79.4°	30°59.1'	+10.1'	80.0°	31°09.2'	+11.3'	80.6°	31°18.7'	+12.4'	81.2°	31°27.5'	+13.6'	81.8°	17
18	30°31.8'	+05.9'	77.1°	30°44.9'	+07.1'	77.7°	30°57.3'	+08.3'	78.3°	31°09.2'	+09.5'	78.9°	31°20.5'	+10.6'	79.5°	31°31.1'	+11.8'	80.1°	31°41.1'	+13.0'	80.7°	18
19	30°37.7'	+05.3'	76.0°	30°52.0'	+06.5'	76.6°	31°05.6'	+07.7'	77.1°	31°18.7'	+08.8'	77.7°	31°31.1'	+10.0'	78.3°	31°42.9'	+11.2'	78.9°	31°54.1'	+12.4'	79.5°	19
20	30°43.0'	+04.7'	74.8°	30°58.4'	+05.9'	75.4°	31°13.3'	+07.0'	76.0°	31°27.5'	+08.2'	76.6°	31°41.1'	+09.4'	77.2°	31°54.1'	+10.6'	77.8°	32°06.5'	+11.8'	78.4°	20
21	30°47.7'	+04.1'	73.7°	31°04.3'	+05.2'	74.2°	31°20.3'	+06.4'	74.8°	31°35.7'	+07.6'	75.4°	31°50.5'	+08.8'	76.0°	32°04.7'	+09.9'	76.6°	32°18.3'	+11.1'	77.2°	21
22	30°51.8'	+03.4'	72.5°	31°09.5'	+04.6'	73.1°	31°26.7'	+05.8'	73.7°	31°43.3'	+06.9'	74.2°	31°59.3'	+08.1'	74.8°	32°14.7'	+09.3'	75.4°	32°29.4'	+10.5'	76.1°	22
23	30°55.2'	+02.8'	71.3°	31°14.1'	+04.0'	71.9°	31°32.5'	+05.1'	72.5°	31°50.2'	+06.3'	73.1°	32°07.4'	+07.5'	73.7°	32°24.0'	+08.6'	74.3°	32°39.9'	+09.8'	74.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

62° 298° LHA

Latitude SAME as Declination

62° 298° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

63° 297° LHA

Latitude SAME as Declination

63° 297° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	26°08.2'	+15.9'	97.0°	26°00.6'	+17.0'	97.5°	25°52.5'	+18.1'	98.0°	25°43.9'	+19.2'	98.5°	25°34.8'	+20.3'	98.9°	25°25.2'	+21.4'	99.4°	25°15.2'	+22.5'	99.9°	0
1	26°24.1'	+15.4'	96.0°	26°17.6'	+16.6'	96.4°	26°10.6'	+17.7'	96.9°	26°03.1'	+18.8'	97.4°	25°55.1'	+19.9'	97.9°	25°46.6'	+21.0'	98.4°	25°37.6'	+22.0'	98.9°	1
2	26°39.5'	+15.0'	94.9°	26°34.2'	+16.1'	95.4°	26°28.3'	+17.2'	95.9°	26°21.9'	+18.3'	96.4°	26°15.0'	+19.4'	96.9°	26°07.6'	+20.5'	97.3°	25°59.7'	+21.6'	97.8°	2
3	26°54.5'	+14.5'	93.8°	26°50.3'	+15.6'	94.3°	26°45.5'	+16.7'	94.8°	26°40.2'	+17.8'	95.3°	26°34.4'	+19.0'	95.8°	26°28.1'	+20.1'	96.3°	26°21.3'	+21.1'	96.8°	3
4	27°08.9'	+13.9'	92.7°	27°05.9'	+15.1'	93.2°	27°02.2'	+16.2'	93.7°	26°58.1'	+17.4'	94.2°	26°53.4'	+18.5'	94.7°	26°48.2'	+19.6'	95.2°	26°42.4'	+20.7'	95.7°	4
5	27°22.9'	+13.4'	91.6°	27°20.9'	+14.6'	92.1°	27°18.5'	+15.7'	92.6°	27°15.4'	+16.9'	93.2°	27°11.9'	+18.0'	93.7°	27°07.8'	+19.1'	94.2°	27°03.1'	+20.2'	94.7°	5
6	27°36.3'	+12.9'	90.5°	27°35.5'	+14.1'	91.0°	27°34.2'	+15.2'	91.5°	27°32.3'	+16.4'	92.1°	27°29.8'	+17.5'	92.6°	27°26.9'	+18.6'	93.1°	27°23.3'	+19.7'	93.6°	6
7	27°49.2'	+12.4'	89.4°	27°49.6'	+13.5'	89.9°	27°49.4'	+14.7'	90.5°	27°48.6'	+15.8'	91.0°	27°47.3'	+17.0'	91.5°	27°45.5'	+18.1'	92.0°	27°43.1'	+19.2'	92.6°	7
8	28°01.6'	+11.8'	88.3°	28°03.1'	+13.0'	88.8°	28°04.1'	+14.2'	89.4°	28°04.5'	+15.3'	89.9°	28°04.3'	+16.5'	90.4°	28°03.6'	+17.6'	91.0°	28°02.3'	+18.7'	91.5°	8
9	28°13.5'	+11.3'	87.2°	28°16.1'	+12.5'	87.7°	28°18.2'	+13.6'	88.3°	28°19.8'	+14.8'	88.8°	28°20.8'	+15.9'	89.3°	28°21.2'	+17.1'	89.9°	28°21.0'	+18.2'	90.4°	9
10	28°24.8'	+10.8'	86.1°	28°28.6'	+11.9'	86.6°	28°31.9'	+13.1'	87.1°	28°34.6'	+14.3'	87.7°	28°36.7'	+15.4'	88.2°	28°38.3'	+16.6'	88.8°	28°39.2'	+17.7'	89.3°	10
11	28°35.5'	+10.2'	84.9°	28°40.5'	+11.4'	85.5°	28°45.0'	+12.5'	86.0°	28°48.8'	+13.7'	86.6°	28°52.1'	+14.9'	87.1°	28°54.8'	+16.0'	87.7°	28°57.0'	+17.2'	88.2°	11
12	28°45.7'	+09.6'	83.8°	28°51.9'	+10.8'	84.4°	28°57.5'	+12.0'	84.9°	29°02.5'	+13.2'	85.5°	29°07.0'	+14.3'	86.0°	29°10.8'	+15.5'	86.6°	29°14.1'	+16.6'	87.1°	12
13	28°55.4'	+09.1'	82.7°	29°02.7'	+10.3'	83.2°	29°09.5'	+11.4'	83.8°	29°15.7'	+12.6'	84.4°	29°21.3'	+13.8'	84.9°	29°26.3'	+14.9'	85.5°	29°30.8'	+16.1'	86.0°	13
14	29°04.5'	+08.5'	81.6°	29°13.0'	+09.7'	82.1°	29°20.9'	+10.9'	82.7°	29°28.3'	+12.0'	83.2°	29°35.1'	+13.2'	83.8°	29°41.2'	+14.4'	84.4°	29°46.8'	+15.5'	84.9°	14
15	29°13.0'	+07.9'	80.4°	29°22.7'	+09.1'	81.0°	29°31.8'	+10.3'	81.5°	29°40.3'	+11.5'	82.1°	29°48.3'	+12.6'	82.7°	29°55.6'	+13.8'	83.2°	30°02.4'	+15.0'	83.8°	15
16	29°20.9'	+07.4'	79.3°	29°31.8'	+08.5'	79.9°	29°42.1'	+09.7'	80.4°	29°51.8'	+10.9'	81.0°	30°00.9'	+12.0'	81.5°	30°09.4'	+13.2'	82.1°	30°17.3'	+14.4'	82.7°	16
17	29°28.3'	+06.8'	78.2°	29°40.3'	+07.9'	78.7°	29°51.8'	+09.1'	79.3°	30°02.6'	+10.3'	79.8°	30°12.9'	+11.5'	80.4°	30°22.6'	+12.6'	81.0°	30°31.7'	+13.8'	81.6°	17
18	29°35.1'	+06.2'	77.0°	29°48.3'	+07.4'	77.6°	30°00.9'	+08.5'	78.1°	30°12.9'	+09.7'	78.7°	30°24.4'	+10.9'	79.3°	30°35.2'	+12.0'	79.9°	30°45.5'	+13.2'	80.4°	18
19	29°41.2'	+05.6'	75.9°	29°55.6'	+06.8'	76.4°	30°09.4'	+07.9'	77.0°	30°22.6'	+09.1'	77.6°	30°35.2'	+10.3'	78.1°	30°47.3'	+11.4'	78.7°	30°58.7'	+12.6'	79.3°	19
20	29°46.8'	+05.0'	74.7°	30°02.4'	+06.2'	75.3°	30°17.3'	+07.3'	75.8°	30°31.7'	+08.5'	76.4°	30°45.5'	+09.7'	77.0°	30°58.7'	+10.8'	77.6°	31°11.3'	+12.0'	78.2°	20
21	29°51.8'	+04.4'	73.6°	30°08.5'	+05.6'	74.1°	30°24.7'	+06.7'	74.7°	30°40.2'	+07.9'	75.3°	30°55.2'	+09.0'	75.8°	31°09.6'	+10.2'	76.4°	31°23.3'	+11.4'	77.0°	21
22																						

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

64° 296° LHA

Latitude SAME as Declination

64° 296° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	25°10.4'	+15.8'	96.7°	25°03.1'	+16.9'	97.2°	24°55.3'	+18.0'	97.7°	24°47.1'	+19.1'	98.1°	24°38.4'	+20.2'	98.6°	24°29.2'	+21.3'	99.0°	24°19.6'	+22.3'	99.5°	0
1	25°26.2'	+15.3'	95.7°	25°20.0'	+16.5'	96.1°	25°13.4'	+17.6'	96.6°	25°06.2'	+18.7'	97.1°	24°58.6'	+19.8'	97.5°	24°50.5'	+20.8'	98.0°	24°41.9'	+21.9'	98.5°	1
2	25°41.5'	+14.9'	94.6°	25°36.5'	+16.0'	95.1°	25°30.9'	+17.1'	95.5°	25°24.9'	+18.2'	96.0°	25°18.3'	+19.3'	96.5°	25°11.3'	+20.4'	97.0°	25°03.8'	+21.5'	97.4°	2
3	25°56.4'	+14.4'	93.5°	25°52.5'	+15.5'	94.0°	25°48.0'	+16.6'	94.5°	25°43.1'	+17.8'	95.0°	25°37.6'	+18.9'	95.4°	25°31.7'	+20.0'	95.9°	25°25.3'	+21.0'	96.4°	3
4	26°10.8'	+13.9'	92.4°	26°08.0'	+15.0'	92.9°	26°04.7'	+16.2'	93.4°	26°00.8'	+17.3'	93.9°	25°56.5'	+18.4'	94.4°	25°51.7'	+19.5'	94.9°	25°46.3'	+20.6'	95.4°	4
5	26°24.7'	+13.4'	91.3°	26°23.0'	+14.6'	91.8°	26°20.8'	+15.7'	92.3°	26°18.1'	+16.8'	92.8°	26°14.9'	+17.9'	93.3°	26°11.2'	+19.0'	93.8°	26°06.9'	+20.1'	94.3°	5
6	26°38.1'	+12.9'	90.3°	26°37.6'	+14.1'	90.8°	26°36.5'	+15.2'	91.3°	26°34.9'	+16.3'	91.8°	26°32.8'	+17.4'	92.3°	26°30.2'	+18.6'	92.8°	26°27.0'	+19.7'	93.3°	6
7	26°51.0'	+12.4'	89.2°	26°51.6'	+13.6'	89.7°	26°51.7'	+14.7'	90.2°	26°51.3'	+15.8'	90.7°	26°50.3'	+17.0'	91.2°	26°48.8'	+18.1'	91.7°	26°46.7'	+19.2'	92.2°	7
8	27°03.4'	+11.9'	88.1°	27°05.2'	+13.0'	88.6°	27°06.4'	+14.2'	89.1°	27°07.1'	+15.3'	89.6°	27°07.2'	+16.5'	90.1°	27°06.8'	+17.6'	90.6°	27°05.9'	+18.7'	91.1°	8
9	27°15.3'	+11.4'	87.0°	27°18.2'	+12.5'	87.5°	27°20.6'	+13.7'	88.0°	27°22.4'	+14.8'	88.5°	27°23.7'	+16.0'	89.0°	27°24.4'	+17.1'	89.6°	27°24.6'	+18.2'	90.1°	9
10	27°26.7'	+10.9'	85.9°	27°30.8'	+12.0'	86.4°	27°34.3'	+13.2'	86.9°	27°37.2'	+14.3'	87.4°	27°39.7'	+15.5'	87.9°	27°41.5'	+16.6'	88.5°	27°42.9'	+17.7'	89.0°	10
11	27°37.6'	+10.3'	84.8°	27°42.8'	+11.5'	85.3°	27°47.4'	+12.6'	85.8°	27°51.6'	+13.8'	86.3°	27°55.1'	+14.9'	86.9°	27°58.1'	+16.1'	87.4°	28°00.6'	+17.2'	87.9°	11
12	27°47.9'	+09.8'	83.6°	27°54.2'	+10.9'	84.2°	28°00.1'	+12.1'	84.7°	28°05.3'	+13.3'	85.2°	28°10.1'	+14.4'	85.8°	28°14.2'	+15.6'	86.3°	28°17.8'	+16.7'	86.8°	12
13	27°57.7'	+09.2'	82.5°	28°05.2'	+10.4'	83.1°	28°12.2'	+11.6'	83.6°	28°18.6'	+12.7'	84.1°	28°24.5'	+13.9'	84.7°	28°29.8'	+15.0'	85.2°	28°34.5'	+16.2'	85.7°	13
14	28°06.9'	+08.7'	81.4°	28°15.6'	+09.9'	81.9°	28°23.7'	+11.0'	82.5°	28°31.3'	+12.2'	83.0°	28°38.3'	+13.3'	83.5°	28°44.8'	+14.5'	84.1°	28°50.7'	+15.6'	84.6°	14
15	28°15.6'	+08.1'	80.3°	28°25.4'	+09.3'	80.8°	28°34.7'	+10.5'	81.3°	28°43.5'	+11.6'	81.9°	28°51.7'	+12.8'	82.4°	28°59.3'	+13.9'	83.0°	29°06.3'	+15.1'	83.5°	15
16	28°23.7'	+07.6'	79.2°	28°34.7'	+08.7'	79.7°	28°45.2'	+09.9'	80.2°	28°55.1'	+11.1'	80.8°	29°04.5'	+12.2'	81.3°	29°13.2'	+13.4'	81.9°	29°21.4'	+14.5'	82.4°	16
17	28°31.3'	+07.0'	78.0°	28°43.5'	+08.2'	78.6°	28°55.1'	+09.3'	79.1°	29°06.2'	+10.5'	79.6°	29°16.7'	+11.7'	80.2°	29°26.6'	+12.8'	80.8°	29°36.0'	+14.0'	81.3°	17
18	28°38.3'	+06.5'	76.9°	28°51.7'	+07.6'	77.4°	29°04.5'	+08.8'	78.0°	29°16.7'	+09.9'	78.5°	29°28.3'	+11.1'	79.1°	29°39.4'	+12.2'	79.6°	29°49.9'	+13.4'	80.2°	18
19	28°44.8'	+05.9'	75.8°	28°59.3'	+07.0'	76.3°	29°13.2'	+08.2'	76.8°	29°26.6'	+09.4'	77.4°	29°39.4'	+10.5'	77.9°	29°51.7'	+11.7'	78.5°	30°03.3'	+12.8'	79.1°	19
20	28°50.7'	+05.3'	74.6°	29°06.3'	+06.5'	75.2°	29°21.4'	+07.6'	75.7°	29°36.0'	+08.8'	76.3°	29°49.9'	+09.9'	76.8°	30°03.3'	+11.1'	77.4°	30°16.2'	+12.2'	77.9°	20
21	28°56.0'	+04.7'	73.5°	29°12.8'	+05.9'	74.0°	29°29.0'	+07.0'	74.6°	29°44.7'	+08.2'	75.1°	29°59.9'	+09.3'	75.7°	30°14.4'	+10.5'	76.2°	30°28.4'	+11.7'	76.8°	21
22	29°00.8'	+04.2'	72.4°	29°18.7'	+05.3'	72.9°	29°36.1'	+06.4'	73.4°	29°52.9'	+07.6'	74.0°	30°09.2'	+08.7'	74.5°	30°24.9'	+09.9'	75.1°	30°40.1'	+11.1'	75.7°	22
23	29°04.9'	+03.6'	71.2°	29°24.0'	+04.7'	71.7°	29°42.5'	+05.9'	72.3°	30°00.5'	+07.0'	72.8°	30°18.0'	+08.1'	73.4°	30°34.8'	+09.3'	73.9°	30°51.1'	+10.5'	74.5°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

64° 296° LHA

Latitude SAME as Declination

64° 296° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

65° 295° LHA

Latitude SAME as Declination

65° 295° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	24°12.5'	+15.7'	96.4°	24°05.6'	+16.8'	96.9°	23°58.2'	+17.9'	97.3°	23°50.3'	+19.0'	97.8°	23°41.9'	+20.0'	98.2°	23°33.2'	+21.1'	98.6°	23°23.9'	+22.2'	99.1°	0
1	24°28.2'	+15.2'	95.4°	24°22.4'	+16.4'	95.8°	24°16.0'	+17.5'	96.3°	24°09.2'	+18.5'	96.7°	24°02.0'	+19.6'	97.2°	23°54.3'	+20.7'	97.6°	23°46.1'	+21.8'	98.0°	1
2	24°43.5'	+14.8'	94.3°	24°38.7'	+15.9'	94.8°	24°33.5'	+17.0'	95.2°	24°27.8'	+18.1'	95.7°	24°21.6'	+19.2'	96.1°	24°15.0'	+20.3'	96.6°	24°07.9'	+21.4'	97.0°	2
3	24°58.3'	+14.3'	93.2°	24°54.6'	+15.5'	93.7°	24°50.5'	+16.6'	94.2°	24°45.9'	+17.7'	94.6°	24°40.8'	+18.8'	95.1°	24°35.3'	+19.9'	95.5°	24°29.2'	+20.9'	96.0°	3
4	25°12.6'	+13.9'	92.2°	25°10.1'	+15.0'	92.6°	25°07.1'	+16.1'	93.1°	25°03.6'	+17.2'	93.6°	24°59.6'	+18.3'	94.0°	24°55.1'	+19.4'	94.5°	24°50.2'	+20.5'	95.0°	4
5	25°26.5'	+13.4'	91.1°	25°25.1'	+14.5'	91.6°	25°23.2'	+15.7'	92.0°	25°20.8'	+16.8'	92.5°	25°17.9'	+17.9'	93.0°	25°14.5'	+19.0'	93.5°	25°10.7'	+20.1'	93.9°	5
6	25°39.9'	+12.9'	90.0°	25°39.6'	+14.1'	90.5°	25°38.8'	+15.2'	91.0°	25°37.6'	+16.3'	91.5°	25°35.8'	+17.4'	91.9°	25°33.5'	+18.5'	92.4°	25°30.7'	+19.6'	92.9°	6
7	25°52.8'	+12.4'	88.9°	25°53.7'	+13.6'	89.4°	25°54.0'	+14.7'	89.9°	25°53.9'	+15.8'	90.4°	25°53.2'	+17.0'	90.9°	25°52.1'	+18.1'	91.4°	25°50.4'	+19.2'	91.8°	7
8	26°05.2'	+11.9'	87.8°	26°07.3'	+13.1'	88.3°	26°08.7'	+14.2'	88.8°	26°09.7'	+15.4'	89.3°	26°10.2'	+16.5'	89.8°	26°10.1'	+17.6'	90.3°	26°09.6'	+18.7'	90.8°	8
9	26°17.2'	+11.4'	86.8°	26°20.3'	+12.6'	87.2°	26°23.0'	+13.7'	87.7°	26°25.1'	+14.9'	88.2°	26°26.7'	+16.0'	88.7°	26°27.7'	+17.1'	89.2°	26°28.3'	+18.2'	89.7°	9
10	26°28.6'	+10.9'	85.7°	26°32.9'	+12.1'	86.2°	26°36.7'	+13.2'	86.7°	26°39.9'	+14.4'	87.2°	26°42.6'	+15.5'	87.7°	26°44.8'	+16.6'	88.2°	26°46.5'	+17.8'	88.7°	10
11	26°39.6'	+10.4'	84.6°	26°45.0'	+11.6'	85.1°	26°49.9'	+12.7'	85.6°	26°54.3'	+13.9'	86.1°	26°58.2'	+15.0'	86.6°	27°01.5'	+16.1'	87.1°	27°04.3'	+17.3'	87.6°	11
12	26°50.0'	+09.9'	83.5°	26°56.6'	+11.1'	84.0°	27°02.7'	+12.2'	84.5°	27°08.2'	+13.4'	85.0°	27°13.2'	+14.5'	85.5°	27°17.6'	+15.6'	86.0°	27°21.5'	+16.8'	86.5°	12
13	27°00.0'	+09.4'	82.3°	27°07.7'	+10.6'	82.9°	27°14.9'	+11.7'	83.4°	27°21.5'	+12.8'	83.9°	27°27.7'	+14.0'	84.4°	27°33.3'	+15.1'	84.9°	27°38.3'	+16.3'	85.4°	13
14	27°09.3'	+08.9'	81.2°	27°18.2'	+10.0'	81.7°	27°26.6'	+11.2'	82.3°	27°34.4'	+12.3'	82.8°	27°41.7'	+13.5'	83.3°	27°48.4'	+14.6'	83.8°	27°54.6'	+15.8'	84.3°	14
15	27°18.2'	+08.3'	80.1°	27°28.2'	+09.5'	80.6°	27°37.7'	+10.6'	81.2°	27°46.7'	+11.8'	81.7°	27°55.1'	+12.9'	82.2°	28°03.0'	+14.1'	82.7°	28°10.3'	+15.2'	83.3°	15
16	27°26.6'	+07.8'	79.0°	27°37.7'	+09.0'	79.5°	27°48.4'	+10.1'	80.0°	27°58.5'	+11.3'	80.6°	28°08.1'	+12.4'	81.1°	28°17.1'	+13.6'	81.6°	28°25.5'	+14.7'	82.2°	16
17	27°34.4'	+07.3'	77.9°	27°46.7'	+08.4'	78.4°	27°58.5'	+09.6'	78.9°	28°09.7'	+10.7'	79.4°	28°20.5'	+11.9'	80.0°	28°30.6'	+13.0'	80.5°	28°40.2'	+14.2'	81.0°	17
18	27°41.7'	+06.7'	76.8°	27°55.1'	+07.9'	77.3°	28°08.1'	+09.0'	77.8°	28°20.5'	+10.2'	78.3°	28°32.3'	+11.3'	78.9°	28°43.6'	+12.5'	79.4°	28°54.4'	+13.6'	79.9°	18
19	27°48.4'	+06.2'	75.6°	28°03.0'	+07.3'	76.2°	28°17.1'	+08.5'	76.7°	28°30.6'	+09.6'	77.2°	28°43.6'	+10.8'	77.7°	28°56.1'	+11.9'	78.3°	29°08.0'	+13.1'	78.8°	19
20	27°54.6'	+05.6'	74.5°	28°10.3'	+06.8'	75.0°	28°25.5'	+07.9'	75.6°	28°40.2'	+09.1'	76.1°	28°54.4'	+10.2'	76.6°	29°08.0'	+11.3'	77.2°	29°21.1'	+12.5'	77.7°	20
21	28°00.2'	+05.1'	73.4°	28°17.1'	+06.2'	73.9°	28°33.5'	+07.4'	74.4°	28°49.3'	+08.5'	75.0°	29°04.6'	+09.6'	75.5°	29°19.4'	+10.8'	76.0°	29°33.6'	+11.9'	76.6°	21
22																						

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

66° 294° LHA

Latitude SAME as Declination

66° 294° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	23°14.7'	+15.6'	96.1°	23°08.0'	+16.7'	96.6°	23°00.9'	+17.8'	97.0°	22°53.4'	+18.8'	97.4°	22°45.4'	+19.9'	97.8°	22°37.0'	+21.0'	98.2°	22°28.2'	+22.0'	98.7°	0
1	23°30.3'	+15.2'	95.1°	23°24.7'	+16.3'	95.5°	23°18.7'	+17.4'	96.0°	23°12.2'	+18.4'	96.4°	23°05.4'	+19.5'	96.8°	22°58.0'	+20.6'	97.2°	22°50.2'	+21.6'	97.7°	1
2	23°45.4'	+14.7'	94.0°	23°41.0'	+15.8'	94.5°	23°36.0'	+16.9'	94.9°	23°30.7'	+18.0'	95.3°	23°24.9'	+19.1'	95.8°	23°18.6'	+20.2'	96.2°	23°11.9'	+21.2'	96.6°	2
3	24°00.1'	+14.3'	93.0°	23°56.8'	+15.4'	93.4°	23°53.0'	+16.5'	93.9°	23°48.7'	+17.6'	94.3°	23°44.0'	+18.7'	94.7°	23°38.8'	+19.8'	95.2°	23°33.1'	+20.8'	95.6°	3
4	24°14.4'	+13.8'	91.9°	24°12.2'	+15.0'	92.4°	24°09.5'	+16.1'	92.8°	24°06.3'	+17.2'	93.3°	24°02.7'	+18.3'	93.7°	23°58.5'	+19.4'	94.2°	23°54.0'	+20.4'	94.6°	4
5	24°28.3'	+13.4'	90.8°	24°27.2'	+14.5'	91.3°	24°25.6'	+15.6'	91.8°	24°23.5'	+16.7'	92.2°	24°20.9'	+17.8'	92.7°	24°17.9'	+18.9'	93.1°	24°14.4'	+20.0'	93.6°	5
6	24°41.7'	+12.9'	89.8°	24°41.7'	+14.1'	90.2°	24°41.2'	+15.2'	90.7°	24°40.2'	+16.3'	91.2°	24°38.8'	+17.4'	91.6°	24°36.8'	+18.5'	92.1°	24°34.4'	+19.6'	92.5°	6
7	24°54.6'	+12.5'	88.7°	24°55.7'	+13.6'	89.2°	24°56.4'	+14.7'	89.6°	24°56.5'	+15.8'	90.1°	24°56.2'	+17.0'	90.6°	24°55.3'	+18.1'	91.0°	24°54.0'	+19.2'	91.5°	7
8	25°07.1'	+12.0'	87.6°	25°09.3'	+13.1'	88.1°	25°11.1'	+14.3'	88.6°	25°12.3'	+15.4'	89.0°	25°13.1'	+16.5'	89.5°	25°13.4'	+17.6'	90.0°	25°13.2'	+18.7'	90.4°	8
9	25°19.1'	+11.5'	86.5°	25°22.5'	+12.7'	87.0°	25°25.3'	+13.8'	87.5°	25°27.7'	+14.9'	88.0°	25°29.6'	+16.0'	88.4°	25°31.0'	+17.1'	88.9°	25°31.9'	+18.3'	89.4°	9
10	25°30.6'	+11.0'	85.5°	25°35.1'	+12.2'	85.9°	25°39.1'	+13.3'	86.4°	25°42.6'	+14.4'	86.9°	25°45.6'	+15.6'	87.4°	25°48.1'	+16.7'	87.8°	25°50.1'	+17.8'	88.3°	10
11	25°41.6'	+10.6'	84.4°	25°47.3'	+11.7'	84.8°	25°52.4'	+12.8'	85.3°	25°57.1'	+14.0'	85.8°	26°01.2'	+15.1'	86.3°	26°04.8'	+16.2'	86.8°	26°07.9'	+17.3'	87.3°	11
12	25°52.2'	+10.1'	83.3°	25°59.0'	+11.2'	83.8°	26°05.3'	+12.3'	84.2°	26°11.0'	+13.5'	84.7°	26°16.3'	+14.6'	85.2°	26°21.0'	+15.7'	85.7°	26°25.3'	+16.8'	86.2°	12
13	26°02.3'	+09.6'	82.2°	26°10.2'	+10.7'	82.7°	26°17.6'	+11.8'	83.1°	26°24.5'	+13.0'	83.6°	26°30.9'	+14.1'	84.1°	26°36.8'	+15.2'	84.6°	26°42.1'	+16.4'	85.1°	13
14	26°11.8'	+09.1'	81.1°	26°20.9'	+10.2'	81.6°	26°29.4'	+11.3'	82.1°	26°37.5'	+12.5'	82.5°	26°45.0'	+13.6'	83.0°	26°52.0'	+14.7'	83.5°	26°58.5'	+15.9'	84.1°	14
15	26°20.9'	+08.6'	80.0°	26°31.1'	+09.7'	80.5°	26°40.8'	+10.8'	81.0°	26°49.9'	+12.0'	81.5°	26°58.6'	+13.1'	82.0°	27°06.7'	+14.2'	82.5°	27°14.3'	+15.4'	83.0°	15
16	26°29.4'	+08.0'	78.9°	26°40.8'	+09.2'	79.4°	26°51.6'	+10.3'	79.9°	27°01.9'	+11.5'	80.4°	27°11.7'	+12.6'	80.9°	27°21.0'	+13.7'	81.4°	27°29.7'	+14.9'	81.9°	16
17	26°37.5'	+07.5'	77.8°	26°49.9'	+08.7'	78.2°	27°01.9'	+09.8'	78.7°	27°13.4'	+10.9'	79.2°	27°24.3'	+12.1'	79.8°	27°34.7'	+13.2'	80.3°	27°44.6'	+14.3'	80.8°	17
18	26°45.0'	+07.0'	76.6°	26°58.6'	+08.1'	77.1°	27°11.7'	+09.3'	77.6°	27°24.3'	+10.4'	78.1°	27°36.4'	+11.5'	78.7°	27°47.9'	+12.7'	79.2°	27°58.9'	+13.8'	79.7°	18
19	26°52.0'	+06.5'	75.5°	27°06.7'	+07.6'	76.0°	27°21.0'	+08.7'	76.5°	27°34.7'	+09.9'	77.0°	27°47.9'	+11.0'	77.5°	28°00.6'	+12.1'	78.1°	28°12.7'	+13.3'	78.6°	19
20	26°58.5'	+06.0'	74.4°	27°14.3'	+07.1'	74.9°	27°29.7'	+08.2'	75.4°	27°44.6'	+09.3'	75.9°	27°58.9'	+10.5'	76.4°	28°12.7'	+11.6'	77.0°	28°26.0'	+12.7'	77.5°	20
21	27°04.4'	+05.4'	73.3°	27°21.4'	+06.5'	73.8°	27°37.9'	+07.7'	74.3°	27°53.9'	+08.8'	74.8°	28°09.4'	+09.9'	75.3°	28°24.3'	+11.1'	75.8°	28°38.7'	+12.2'	76.4°	21
22	27°09.9'	+04.9'	72.2°	27°28.0'	+06.0'	72.7°	27°45.6'	+07.1'	73.2°	28°02.7'	+08.2'	73.7°	28°19.3'	+09.4'	74.2°	28°35.4'	+10.5'	74.7°	28°50.9'	+11.6'	75.2°	22
23	27°14.7'	+04.4'	71.1°	27°34.0'	+05.5'	71.6°	27°52.7'	+06.6'	72.1°	28°11.0'	+07.7'	72.6°	28°28.7'	+08.8'	73.1°	28°45.9'	+09.9'	73.6°	29°02.6'	+11.1'	74.1°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

66° 294° LHA

Latitude SAME as Declination

66° 294° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

67° 293° LHA

Latitude SAME as Declination

67° 293° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	22°16.8'	+15.5'	95.9°	22°10.4'	+16.6'	96.3°	22°03.7'	+17.7'	96.7°	21°56.5'	+18.7'	97.1°	21°48.9'	+19.8'	97.5°	21°40.9'	+20.8'	97.9°	21°32.5'	+21.9'	98.3°	0
1	22°32.3'	+15.1'	94.8°	22°27.0'	+16.2'	95.2°	22°21.3'	+17.3'	95.6°	22°15.2'	+18.3'	96.0°	22°08.7'	+19.4'	96.5°	22°01.7'	+20.5'	96.9°	21°54.3'	+21.5'	97.3°	1
2	22°47.3'	+14.7'	93.8°	22°43.2'	+15.8'	94.2°	22°38.6'	+16.9'	94.6°	22°33.5'	+17.9'	95.0°	22°28.1'	+19.0'	95.4°	22°22.2'	+20.1'	95.8°	22°15.9'	+21.1'	96.3°	2
3	23°02.0'	+14.2'	92.7°	22°58.9'	+15.3'	93.1°	22°55.4'	+16.4'	93.6°	22°51.5'	+17.5'	94.0°	22°47.1'	+18.6'	94.4°	22°42.3'	+19.7'	94.8°	22°37.0'	+20.8'	95.2°	3
4	23°16.2'	+13.8'	91.7°	23°14.3'	+14.9'	92.1°	23°11.9'	+16.0'	92.5°	23°09.0'	+17.1'	92.9°	23°05.7'	+18.2'	93.4°	23°02.0'	+19.3'	93.8°	22°57.8'	+20.4'	94.2°	4
5	23°30.1'	+13.4'	90.6°	23°29.2'	+14.5'	91.0°	23°27.9'	+15.6'	91.5°	23°26.1'	+16.7'	91.9°	23°23.9'	+17.8'	92.3°	23°21.2'	+18.9'	92.8°	23°18.1'	+20.0'	93.2°	5
6	23°43.5'	+13.0'	89.5°	23°43.7'	+14.1'	90.0°	23°43.5'	+15.2'	90.4°	23°42.8'	+16.3'	90.9°	23°41.7'	+17.4'	91.3°	23°40.1'	+18.5'	91.7°	23°38.1'	+19.6'	92.2°	6
7	23°56.4'	+12.5'	88.5°	23°57.8'	+13.6'	88.9°	23°58.7'	+14.7'	89.4°	23°59.1'	+15.8'	89.8°	23°59.1'	+17.0'	90.2°	23°58.6'	+18.1'	90.7°	23°57.7'	+19.1'	91.1°	7
8	24°08.9'	+12.1'	87.4°	24°11.4'	+13.2'	87.8°	24°13.4'	+14.3'	88.3°	24°15.0'	+15.4'	88.7°	24°16.1'	+16.5'	89.2°	24°16.7'	+17.6'	89.6°	24°16.8'	+18.7'	90.1°	8
9	24°21.0'	+11.6'	86.3°	24°24.6'	+12.7'	86.8°	24°27.7'	+13.8'	87.2°	24°30.4'	+15.0'	87.7°	24°32.6'	+16.1'	88.1°	24°34.3'	+17.2'	88.6°	24°35.5'	+18.3'	89.1°	9
10	24°32.6'	+11.1'	85.2°	24°37.3'	+12.3'	85.7°	24°41.6'	+13.4'	86.2°	24°45.3'	+14.5'	86.6°	24°48.6'	+15.6'	87.1°	24°51.5'	+16.7'	87.5°	24°53.8'	+17.8'	88.0°	10
11	24°43.7'	+10.7'	84.2°	24°49.6'	+11.8'	84.6°	24°55.0'	+12.9'	85.1°	24°59.9'	+14.0'	85.5°	25°04.3'	+15.2'	86.0°	25°08.2'	+16.3'	86.5°	25°11.6'	+17.4'	87.0°	11
12	24°54.4'	+10.2'	83.1°	25°01.4'	+11.3'	83.5°	25°07.9'	+12.5'	84.0°	25°13.9'	+13.6'	84.5°	25°19.4'	+14.7'	84.9°	25°24.5'	+15.8'	85.4°	25°29.0'	+16.9'	85.9°	12
13	25°04.6'	+09.7'	82.0°	25°12.7'	+10.9'	82.5°	25°20.3'	+12.0'	82.9°	25°27.5'	+13.1'	83.4°	25°34.1'	+14.2'	83.9°	25°40.3'	+15.3'	84.3°	25°46.0'	+16.5'	84.8°	13
14	25°14.3'	+09.2'	80.9°	25°23.6'	+10.4'	81.4°	25°32.3'	+11.5'	81.8°	25°40.6'	+12.6'	82.3°	25°48.4'	+13.8'	82.8°	25°55.6'	+14.9'	83.3°	26°02.4'	+16.0'	83.8°	14
15	25°23.6'	+08.8'	79.8°	25°33.9'	+09.9'	80.3°	25°43.8'	+11.0'	80.8°	25°53.2'	+12.1'	81.2°	26°02.1'	+13.3'	81.7°	26°10.5'	+14.4'	82.2°	26°18.4'	+15.5'	82.7°	15
16	25°32.3'	+08.3'	78.7°	25°43.8'	+09.4'	79.2°	25°54.8'	+10.5'	79.7°	26°05.4'	+11.6'	80.1°	26°15.4'	+12.8'	80.6°	26°24.9'	+13.9'	81.1°	26°33.9'	+15.0'	81.6°	16
17	25°40.6'	+07.8'	77.6°	25°53.2'	+08.9'	78.1°	26°05.4'	+10.0'	78.6°	26°17.0'	+11.1'	79.0°	26°28.2'	+12.3'	79.5°	26°38.8'	+13.4'	80.0°	26°48.9'	+14.5'	80.5°	17
18	25°48.4'	+07.3'	76.5°	26°02.1'	+08.4'	77.0°	26°15.4'	+09.5'	77.5°	26°28.2'	+10.6'	78.0°	26°40.4'	+11.8'	78.4°	26°52.2'	+12.9'	78.9°	27°03.5'	+14.0'	79.4°	18
19	25°55.6'	+06.8'	75.4°	26°10.5'	+07.9'	75.9°	26°24.9'	+09.0'	76.4°	26°38.8'	+10.1'	76.9°	26°52.2'	+11.3'	77.3°	27°05.1'	+12.4'	77.8°	27°17.5'	+13.5'	78.3°	19
20	26°02.4'	+06.3'	74.3°	26°18.4'	+07.4'	74.8°	26°33.9'	+08.5'	75.3°	26°48.9'	+09.6'	75.7°	27°03.5'	+10.7'	76.2°	27°17.5'	+11.9'	76.7°	27°31.0'	+13.0'	77.2°	20
21	26°08.7'	+05.8'	73.2°	26°25.8'	+06.9'	73.7°	26°42.4'	+08.0'	74.2°	26°58.6'	+09.1'	74.6°	27°14.2'	+10.2'	75.1°	27°29.3'	+11.3'	75.6°	27°44.0'	+12.5'	76.1°	21
22																						

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

68° 292° LHA

Latitude SAME as Declination

68° 292° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	21°18.8'	+15.4'	95.6°	21°12.8'	+16.5'	96.0°	21°06.4'	+17.5'	96.4°	20°59.5'	+18.6'	96.7°	20°52.3'	+19.7'	97.1°	20°44.7'	+20.7'	97.5°	20°36.6'	+21.8'	97.9°	0
1	21°34.2'	+15.0'	94.5°	21°29.3'	+16.1'	94.9°	21°23.9'	+17.2'	95.3°	21°18.1'	+18.2'	95.7°	21°11.9'	+19.3'	96.1°	21°05.4'	+20.4'	96.5°	20°58.4'	+21.4'	96.9°	1
2	21°49.2'	+14.6'	93.5°	21°45.4'	+15.7'	93.9°	21°41.1'	+16.8'	94.3°	21°36.4'	+17.9'	94.7°	21°31.3'	+18.9'	95.1°	21°25.7'	+20.0'	95.5°	21°19.8'	+21.0'	95.9°	2
3	22°03.8'	+14.2'	92.5°	22°01.1'	+15.3'	92.9°	21°57.9'	+16.4'	93.3°	21°54.2'	+17.5'	93.7°	21°50.2'	+18.6'	94.1°	21°45.7'	+19.6'	94.5°	21°40.8'	+20.7'	94.9°	3
4	22°18.0'	+13.8'	91.4°	22°16.4'	+14.9'	91.8°	22°14.2'	+16.0'	92.2°	22°11.7'	+17.1'	92.6°	22°08.7'	+18.2'	93.0°	22°05.3'	+19.2'	93.4°	22°01.5'	+20.3'	93.9°	4
5	22°31.9'	+13.4'	90.4°	22°31.3'	+14.5'	90.8°	22°30.2'	+15.6'	91.2°	22°28.8'	+16.7'	91.6°	22°26.9'	+17.8'	92.0°	22°24.6'	+18.9'	92.4°	22°21.8'	+19.9'	92.8°	5
6	22°45.2'	+13.0'	89.3°	22°45.8'	+14.1'	89.7°	22°45.8'	+15.2'	90.1°	22°45.5'	+16.3'	90.6°	22°44.7'	+17.4'	91.0°	22°43.4'	+18.5'	91.4°	22°41.7'	+19.5'	91.8°	6
7	22°58.2'	+12.5'	88.2°	22°59.8'	+13.7'	88.7°	23°01.0'	+14.8'	89.1°	23°01.7'	+15.9'	89.5°	23°02.0'	+17.0'	89.9°	23°01.9'	+18.1'	90.4°	23°01.3'	+19.1'	90.8°	7
8	23°10.8'	+12.1'	87.2°	23°13.5'	+13.2'	87.6°	23°15.8'	+14.3'	88.0°	23°17.6'	+15.4'	88.5°	23°19.0'	+16.5'	88.9°	23°19.9'	+17.6'	89.3°	23°20.4'	+18.7'	89.8°	8
9	23°22.9'	+11.7'	86.1°	23°26.7'	+12.8'	86.5°	23°30.1'	+13.9'	87.0°	23°33.1'	+15.0'	87.4°	23°35.5'	+16.1'	87.8°	23°37.6'	+17.2'	88.3°	23°39.1'	+18.3'	88.7°	9
10	23°34.6'	+11.2'	85.0°	23°39.5'	+12.4'	85.5°	23°44.0'	+13.5'	85.9°	23°48.1'	+14.6'	86.4°	23°51.7'	+15.7'	86.8°	23°54.8'	+16.8'	87.2°	23°57.4'	+17.9'	87.7°	10
11	23°45.8'	+10.8'	84.0°	23°51.9'	+11.9'	84.4°	23°57.5'	+13.0'	84.8°	24°02.7'	+14.1'	85.3°	24°07.4'	+15.3'	85.7°	24°11.6'	+16.4'	86.2°	24°15.3'	+17.5'	86.6°	11
12	23°56.6'	+10.3'	82.9°	24°03.8'	+11.5'	83.3°	24°10.5'	+12.6'	83.8°	24°16.8'	+13.7'	84.2°	24°22.6'	+14.8'	84.7°	24°27.9'	+15.9'	85.1°	24°32.8'	+17.0'	85.6°	12
13	24°07.0'	+09.9'	81.8°	24°15.3'	+11.0'	82.3°	24°23.1'	+12.1'	82.7°	24°30.5'	+13.2'	83.2°	24°37.4'	+14.4'	83.6°	24°43.9'	+15.5'	84.1°	24°49.8'	+16.6'	84.5°	13
14	24°16.8'	+09.4'	80.7°	24°26.3'	+10.6'	81.2°	24°35.2'	+11.7'	81.6°	24°43.7'	+12.8'	82.1°	24°51.8'	+13.9'	82.5°	24°59.3'	+15.0'	83.0°	25°06.4'	+16.1'	83.5°	14
15	24°26.3'	+09.0'	79.6°	24°36.8'	+10.1'	80.1°	24°46.9'	+11.2'	80.6°	24°56.5'	+12.3'	81.0°	25°05.7'	+13.4'	81.5°	25°14.3'	+14.5'	81.9°	25°22.5'	+15.7'	82.4°	15
16	24°35.2'	+08.5'	78.6°	24°46.9'	+09.6'	79.0°	24°58.1'	+10.7'	79.5°	25°08.8'	+11.8'	79.9°	25°19.1'	+13.0'	80.4°	25°28.9'	+14.1'	80.9°	25°38.2'	+15.2'	81.3°	16
17	24°43.7'	+08.0'	77.5°	24°56.5'	+09.1'	77.9°	25°08.8'	+10.3'	78.4°	25°20.7'	+11.4'	78.8°	25°32.1'	+12.5'	79.3°	25°42.9'	+13.6'	79.8°	25°53.3'	+14.7'	80.3°	17
18	24°51.8'	+07.5'	76.4°	25°05.7'	+08.7'	76.8°	25°19.1'	+09.8'	77.3°	25°32.1'	+10.9'	77.8°	25°44.5'	+12.0'	78.2°	25°56.5'	+13.1'	78.7°	26°08.1'	+14.2'	79.2°	18
19	24°59.3'	+07.1'	75.3°	25°14.3'	+08.2'	75.7°	25°28.9'	+09.3'	76.2°	25°42.9'	+10.4'	76.7°	25°56.5'	+11.5'	77.1°	26°09.7'	+12.6'	77.6°	26°22.3'	+13.7'	78.1°	19
20	25°06.4'	+06.6'	74.2°	25°22.5'	+07.7'	74.6°	25°38.2'	+08.8'	75.1°	25°53.3'	+09.9'	75.6°	26°08.1'	+11.0'	76.0°	26°22.3'	+12.1'	76.5°	26°36.0'	+13.2'	77.0°	20
21	25°13.0'	+06.1'	73.1°	25°30.2'	+07.2'	73.5°	25°47.0'	+08.3'	74.0°	26°03.3'	+09.4'	74.5°	26°19.1'	+10.5'	74.9°	26°34.4'	+11.6'	75.4°	26°49.3'	+12.7'	75.9°	21
22	25°19.1'	+05.6'	72.0°	25°37.4'	+06.7'	72.4°	25°55.3'	+07.8'	72.9°	26°12.7'	+08.9'	73.4°	26°29.6'	+10.0'	73.9°	26°46.0'	+11.1'	74.3°	27°02.0'	+12.2'	74.8°	22
23	25°24.7'	+05.1'	70.9°	25°44.1'	+06.2'	71.3°	26°03.1'	+07.3'	71.8°	26°21.6'	+08.4'	72.3°	26°39.6'	+09.5'	72.7°	26°57.1'	+10.6'	73.2°	27°14.2'	+11.7'	73.7°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

68° 292° LHA

Latitude SAME as Declination

68° 292° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

69° 291° LHA

Latitude SAME as Declination

69° 291° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	20°20.9'	+15.3'	95.3°	20°15.1'	+16.4'	95.7°	20°09.0'	+17.4'	96.0°	20°02.5'	+18.5'	96.4°	19°55.6'	+19.6'	96.8°	19°48.4'	+20.6'	97.1°	19°40.8'	+21.6'	97.5°	0
1	20°36.2'	+14.9'	94.3°	20°31.5'	+16.0'	94.6°	20°26.5'	+17.1'	95.0°	20°21.0'	+18.1'	95.4°	20°15.2'	+19.2'	95.8°	20°09.0'	+20.3'	96.1°	20°02.4'	+21.3'	96.5°	1
2	20°51.1'	+14.6'	93.2°	20°47.5'	+15.6'	93.6°	20°43.5'	+16.7'	94.0°	20°39.2'	+17.8'	94.4°	20°34.4'	+18.9'	94.7°	20°29.2'	+19.9'	95.1°	20°23.7'	+21.0'	95.5°	2
3	21°05.7'	+14.2'	92.2°	21°03.2'	+15.3'	92.6°	21°00.3'	+16.3'	93.0°	20°57.0'	+17.4'	93.4°	20°53.2'	+18.5'	93.7°	20°49.1'	+19.6'	94.1°	20°44.6'	+20.6'	94.5°	3
4	21°19.8'	+13.8'	91.2°	21°18.4'	+14.9'	91.5°	21°16.6'	+16.0'	91.9°	21°14.4'	+17.0'	92.3°	21°11.7'	+18.1'	92.7°	21°08.7'	+19.2'	93.1°	21°05.3'	+20.3'	93.5°	4
5	21°33.6'	+13.4'	90.1°	21°33.3'	+14.5'	90.5°	21°32.6'	+15.6'	90.9°	21°31.4'	+16.7'	91.3°	21°29.9'	+17.7'	91.7°	21°27.9'	+18.8'	92.1°	21°25.5'	+19.9'	92.5°	5
6	21°47.0'	+13.0'	89.1°	21°47.8'	+14.1'	89.5°	21°48.2'	+15.2'	89.9°	21°48.1'	+16.3'	90.3°	21°47.6'	+17.4'	90.7°	21°46.7'	+18.4'	91.1°	21°45.4'	+19.5'	91.5°	6
7	22°00.0'	+12.6'	88.0°	22°01.9'	+13.7'	88.4°	22°03.3'	+14.8'	88.8°	22°04.4'	+15.9'	89.2°	22°05.0'	+17.0'	89.6°	22°05.1'	+18.1'	90.0°	22°04.9'	+19.1'	90.4°	7
8	22°12.6'	+12.2'	87.0°	22°15.6'	+13.3'	87.4°	22°18.1'	+14.4'	87.8°	22°20.3'	+15.5'	88.2°	22°21.9'	+16.6'	88.6°	22°23.2'	+17.7'	89.0°	22°24.0'	+18.7'	89.4°	8
9	22°24.8'	+11.8'	85.9°	22°28.9'	+12.9'	86.3°	22°32.5'	+14.0'	86.7°	22°35.7'	+15.1'	87.1°	22°38.5'	+16.2'	87.6°	22°40.9'	+17.3'	88.0°	22°42.8'	+18.3'	88.4°	9
10	22°36.6'	+11.3'	84.8°	22°41.8'	+12.5'	85.3°	22°46.5'	+13.6'	85.7°	22°50.8'	+14.7'	86.1°	22°54.7'	+15.8'	86.5°	22°58.1'	+16.9'	86.9°	23°01.1'	+17.9'	87.4°	10
11	22°47.9'	+10.9'	83.8°	22°54.2'	+12.0'	84.2°	23°00.1'	+13.1'	84.6°	23°05.5'	+14.2'	85.0°	23°10.5'	+15.3'	85.5°	23°15.0'	+16.4'	85.9°	23°19.1'	+17.5'	86.3°	11
12	22°58.8'	+10.5'	82.7°	23°06.2'	+11.6'	83.1°	23°13.2'	+12.7'	83.5°	23°19.7'	+13.8'	84.0°	23°25.8'	+14.9'	84.4°	23°31.4'	+16.0'	84.8°	23°36.6'	+17.1'	85.3°	12
13	23°09.3'	+10.1'	81.6°	23°17.9'	+11.2'	82.1°	23°25.9'	+12.3'	82.5°	23°33.5'	+13.4'	82.9°	23°40.7'	+14.5'	83.4°	23°47.4'	+15.6'	83.8°	23°53.7'	+16.7'	84.2°	13
14	23°19.4'	+09.6'	80.6°	23°29.0'	+10.7'	81.0°	23°38.2'	+11.8'	81.4°	23°46.9'	+12.9'	81.9°	23°55.2'	+14.0'	82.3°	24°03.0'	+15.2'	82.7°	24°10.4'	+16.2'	83.2°	14
15	23°29.0'	+09.2'	79.5°	23°39.8'	+10.3'	79.9°	23°50.0'	+11.4'	80.3°	23°59.9'	+12.5'	80.8°	24°09.3'	+13.6'	81.2°	24°18.2'	+14.7'	81.7°	24°26.6'	+15.8'	82.1°	15
16	23°38.2'	+08.7'	78.4°	23°50.0'	+09.8'	78.8°	24°01.4'	+10.9'	79.3°	24°12.4'	+12.0'	79.7°	24°22.9'	+13.2'	80.2°	24°32.9'	+14.3'	80.6°	24°42.4'	+15.4'	81.1°	16
17	23°46.9'	+08.3'	77.3°	23°59.9'	+09.4'	77.8°	24°12.4'	+10.5'	78.2°	24°24.4'	+11.6'	78.6°	24°36.0'	+12.7'	79.1°	24°47.1'	+13.8'	79.5°	24°57.8'	+14.9'	80.0°	17
18	23°55.2'	+07.8'	76.2°	24°09.3'	+08.9'	76.7°	24°22.9'	+10.0'	77.1°	24°36.0'	+11.1'	77.6°	24°48.7'	+12.2'	78.0°	25°00.9'	+13.3'	78.5°	25°12.7'	+14.4'	78.9°	18
19	24°03.0'	+07.4'	75.2°	24°18.2'	+08.5'	75.6°	24°32.9'	+09.6'	76.0°	24°47.1'	+10.7'	76.5°	25°00.9'	+11.8'	76.9°	25°14.3'	+12.9'	77.4°	25°27.1'	+14.0'	77.9°	19
20	24°10.4'	+06.9'	74.1°	24°26.6'	+08.0'	74.5°	24°42.4'	+09.1'	74.9°	24°57.8'	+10.2'	75.4°	25°12.7'	+11.3'	75.8°	25°27.1'	+12.4'	76.3°	25°41.1'	+13.5'	76.8°	20
21	24°17.3'	+06.4'	73.0°	24°34.6'	+07.5'	73.4°	24°51.5'	+08.6'	73.9°	25°08.0'	+09.7'	74.3°	25°24.0'	+10.8'	74.8°	25°39.5'	+11.9'	75.2°	25°54.6'	+13.0'	75.7°	21
22	24°23.7'	+06.0'	71.9°	24°42.1'	+07.0'</																	

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

70° 290° LHA

Latitude SAME as Declination

70° 290° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	19°22.9'	+15.2'	95.0°	19°17.5'	+16.3'	95.4°	19°11.7'	+17.3'	95.7°	19°05.5'	+18.4'	96.1°	18°59.0'	+19.4'	96.4°	18°52.1'	+20.5'	96.8°	18°44.8'	+21.5'	97.1°	0
1	19°38.1'	+14.9'	94.0°	19°33.7'	+15.9'	94.4°	19°29.0'	+17.0'	94.7°	19°23.9'	+18.1'	95.1°	19°18.4'	+19.1'	95.4°	19°12.6'	+20.2'	95.8°	19°06.3'	+21.2'	96.1°	1
2	19°53.0'	+14.5'	93.0°	19°49.7'	+15.6'	93.3°	19°46.0'	+16.7'	93.7°	19°41.9'	+17.7'	94.1°	19°37.5'	+18.8'	94.4°	19°32.7'	+19.8'	94.8°	19°27.5'	+20.9'	95.1°	2
3	20°07.5'	+14.1'	91.9°	20°05.3'	+15.2'	92.3°	20°02.7'	+16.3'	92.7°	19°59.7'	+17.4'	93.0°	19°56.3'	+18.4'	93.4°	19°52.5'	+19.5'	93.8°	19°48.4'	+20.5'	94.1°	3
4	20°21.6'	+13.8'	90.9°	20°20.5'	+14.9'	91.3°	20°19.0'	+15.9'	91.6°	20°17.0'	+17.0'	92.0°	20°14.7'	+18.1'	92.4°	20°12.0'	+19.1'	92.8°	20°09.0'	+20.2'	93.1°	4
5	20°35.4'	+13.4'	89.9°	20°35.4'	+14.5'	90.2°	20°34.9'	+15.6'	90.6°	20°34.1'	+16.7'	91.0°	20°32.8'	+17.7'	91.4°	20°31.2'	+18.8'	91.7°	20°29.2'	+19.9'	92.1°	5
6	20°48.8'	+13.0'	88.8°	20°49.9'	+14.1'	89.2°	20°50.5'	+15.2'	89.6°	20°50.7'	+16.3'	90.0°	20°50.5'	+17.4'	90.3°	20°50.0'	+18.4'	90.7°	20°49.0'	+19.5'	91.1°	6
7	21°01.8'	+12.6'	87.8°	21°04.0'	+13.7'	88.2°	21°05.7'	+14.8'	88.6°	21°07.0'	+15.9'	88.9°	21°07.9'	+17.0'	89.3°	21°08.4'	+18.1'	89.7°	21°08.5'	+19.1'	90.1°	7
8	21°14.5'	+12.3'	86.7°	21°17.7'	+13.3'	87.1°	21°20.5'	+14.4'	87.5°	21°22.9'	+15.5'	87.9°	21°24.9'	+16.6'	88.3°	21°26.5'	+17.7'	88.7°	21°27.7'	+18.8'	89.1°	8
9	21°26.7'	+11.9'	85.7°	21°31.1'	+13.0'	86.1°	21°35.0'	+14.1'	86.5°	21°38.4'	+15.1'	86.9°	21°41.5'	+16.2'	87.3°	21°44.2'	+17.3'	87.7°	21°46.4'	+18.4'	88.1°	9
10	21°38.6'	+11.5'	84.6°	21°44.0'	+12.6'	85.0°	21°49.0'	+13.7'	85.4°	21°53.6'	+14.7'	85.8°	21°57.7'	+15.8'	86.2°	22°01.5'	+16.9'	86.6°	22°04.8'	+18.0'	87.0°	10
11	21°50.1'	+11.1'	83.6°	21°56.6'	+12.2'	84.0°	22°02.7'	+13.3'	84.4°	22°08.3'	+14.3'	84.8°	22°13.6'	+15.4'	85.2°	22°18.4'	+16.5'	85.6°	22°22.8'	+17.6'	86.0°	11
12	22°01.1'	+10.6'	82.5°	22°08.7'	+11.7'	82.9°	22°15.9'	+12.8'	83.3°	22°22.7'	+13.9'	83.7°	22°29.0'	+15.0'	84.1°	22°34.9'	+16.1'	84.6°	22°40.4'	+17.2'	85.0°	12
13	22°11.8'	+10.2'	81.5°	22°20.5'	+11.3'	81.9°	22°28.8'	+12.4'	82.3°	22°36.6'	+13.5'	82.7°	22°44.1'	+14.6'	83.1°	22°51.1'	+15.7'	83.5°	22°57.6'	+16.8'	83.9°	13
14	22°22.0'	+09.8'	80.4°	22°31.8'	+10.9'	80.8°	22°41.2'	+12.0'	81.2°	22°50.1'	+13.1'	81.6°	22°58.7'	+14.2'	82.0°	23°06.8'	+15.3'	82.5°	23°14.4'	+16.4'	82.9°	14
15	22°31.8'	+09.4'	79.3°	22°42.7'	+10.5'	79.7°	22°53.2'	+11.6'	80.1°	23°03.3'	+12.7'	80.6°	23°12.9'	+13.8'	81.0°	23°22.1'	+14.9'	81.4°	23°30.8'	+16.0'	81.8°	15
16	22°41.2'	+09.0'	78.2°	22°53.2'	+10.1'	78.7°	23°04.8'	+11.2'	79.1°	23°15.9'	+12.3'	79.5°	23°26.7'	+13.3'	79.9°	23°36.9'	+14.4'	80.4°	23°46.8'	+15.5'	80.8°	16
17	22°50.1'	+08.5'	77.2°	23°03.3'	+09.6'	77.6°	23°15.9'	+10.7'	78.0°	23°28.2'	+11.8'	78.4°	23°40.0'	+12.9'	78.9°	23°51.4'	+14.0'	79.3°	24°02.3'	+15.1'	79.7°	17
18	22°58.7'	+08.1'	76.1°	23°12.9'	+09.2'	76.5°	23°26.7'	+10.3'	76.9°	23°40.0'	+11.4'	77.4°	23°52.9'	+12.5'	77.8°	24°05.4'	+13.6'	78.2°	24°17.4'	+14.7'	78.7°	18
19	23°06.8'	+07.7'	75.0°	23°22.1'	+08.7'	75.4°	23°36.9'	+09.8'	75.9°	23°51.4'	+10.9'	76.3°	24°05.4'	+12.0'	76.7°	24°18.9'	+13.1'	77.2°	24°32.0'	+14.2'	77.6°	19
20	23°14.4'	+07.2'	73.9°	23°30.8'	+08.3'	74.4°	23°46.8'	+09.4'	74.8°	24°02.3'	+10.5'	75.2°	24°17.4'	+11.6'	75.6°	24°32.0'	+12.7'	76.1°	24°46.2'	+13.7'	76.5°	20
21	23°21.6'	+06.8'	72.9°	23°39.1'	+07.8'	73.3°	23°56.2'	+08.9'	73.7°	24°12.8'	+10.0'	74.1°	24°29.0'	+11.1'	74.6°	24°44.7'	+12.2'	75.0°	25°00.0'	+13.3'	75.5°	21
22	23°28.4'	+06.3'	71.8°	23°46.9'	+07.4'	72.2°	24°05.1'	+08.5'	72.6°	24°22.8'	+09.6'	73.1°	24°40.1'	+10.6'	73.5°	24°56.9'	+11.7'	73.9°	25°13.3'	+12.8'	74.4°	22
23	23°34.7'	+05.9'	70.7°	23°54.3'	+06.9'	71.1°	24°13.6'	+08.0'	71.5°	24°32.3'	+09.1'	72.0°	24°50.7'	+10.2'	72.4°	25°08.6'	+11.3'	72.8°	25°26.1'	+12.3'	73.3°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

70° 290° LHA

Latitude SAME as Declination

70° 290° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

71° 289° LHA

Latitude SAME as Declination

71° 289° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	18°24.9'	+15.1'	94.8°	18°19.7'	+16.2'	95.1°	18°14.2'	+17.3'	95.4°	18°08.4'	+18.3'	95.7°	18°02.2'	+19.3'	96.1°	17°55.7'	+20.4'	96.4°	17°48.9'	+21.4'	96.7°	0
1	18°40.0'	+14.8'	93.7°	18°35.9'	+15.9'	94.1°	18°31.5'	+16.9'	94.4°	18°26.7'	+18.0'	94.7°	18°21.6'	+19.0'	95.1°	18°16.1'	+20.1'	95.4°	18°10.3'	+21.1'	95.7°	1
2	18°54.8'	+14.5'	92.7°	18°51.8'	+15.5'	93.1°	18°48.4'	+16.6'	93.4°	18°44.7'	+17.7'	93.7°	18°40.6'	+18.7'	94.1°	18°36.2'	+19.8'	94.4°	18°31.4'	+20.8'	94.7°	2
3	19°09.3'	+14.1'	91.7°	19°07.4'	+15.2'	92.0°	19°05.0'	+16.3'	92.4°	19°02.4'	+17.3'	92.7°	18°59.3'	+18.4'	93.1°	18°55.9'	+19.4'	93.4°	18°52.2'	+20.5'	93.8°	3
4	19°23.4'	+13.8'	90.7°	19°22.5'	+14.9'	91.0°	19°21.3'	+15.9'	91.4°	19°19.7'	+17.0'	91.7°	19°17.7'	+18.1'	92.1°	19°15.4'	+19.1'	92.4°	19°12.7'	+20.2'	92.8°	4
5	19°37.2'	+13.4'	89.6°	19°37.2'	+14.5'	90.0°	19°37.2'	+15.6'	90.3°	19°36.7'	+16.7'	90.7°	19°35.8'	+17.7'	91.1°	19°34.5'	+18.8'	91.4°	19°32.8'	+19.8'	91.8°	5
6	19°50.6'	+13.1'	88.6°	19°51.9'	+14.1'	89.0°	19°52.8'	+15.2'	89.3°	19°53.3'	+16.3'	89.7°	19°53.5'	+17.4'	90.0°	19°53.3'	+18.4'	90.4°	19°52.6'	+19.5'	90.8°	6
7	20°03.7'	+12.7'	87.6°	20°06.0'	+13.8'	87.9°	20°08.0'	+14.9'	88.3°	20°09.6'	+15.9'	88.7°	20°10.9'	+17.0'	89.0°	20°11.7'	+18.1'	89.4°	20°12.1'	+19.1'	89.8°	7
8	20°16.4'	+12.3'	86.5°	20°19.8'	+13.4'	86.9°	20°22.9'	+14.5'	87.3°	20°25.6'	+15.6'	87.6°	20°27.9'	+16.7'	88.0°	20°29.8'	+17.7'	88.4°	20°31.3'	+18.8'	88.7°	8
9	20°28.7'	+12.0'	85.5°	20°33.2'	+13.0'	85.8°	20°37.4'	+14.1'	86.2°	20°41.2'	+15.2'	86.6°	20°44.5'	+16.3'	87.0°	20°47.5'	+17.4'	87.4°	20°50.1'	+18.4'	87.7°	9
10	20°40.7'	+11.6'	84.4°	20°46.3'	+12.7'	84.8°	20°51.5'	+13.8'	85.2°	20°56.4'	+14.8'	85.6°	21°00.8'	+15.9'	85.9°	21°04.9'	+17.0'	86.3°	21°08.5'	+18.1'	86.7°	10
11	20°52.2'	+11.2'	83.4°	20°58.9'	+12.3'	83.8°	21°05.3'	+13.4'	84.1°	21°11.2'	+14.5'	84.5°	21°16.7'	+15.5'	84.9°	21°21.9'	+16.6'	85.3°	21°26.6'	+17.7'	85.7°	11
12	21°03.4'	+10.8'	82.3°	21°11.2'	+11.9'	82.7°	21°18.6'	+13.0'	83.1°	21°25.7'	+14.1'	83.5°	21°32.3'	+15.2'	83.9°	21°38.5'	+16.2'	84.3°	21°44.3'	+17.3'	84.7°	12
13	21°14.2'	+10.4'	81.3°	21°23.1'	+11.5'	81.7°	21°31.6'	+12.6'	82.0°	21°39.7'	+13.7'	82.4°	21°47.4'	+14.8'	82.8°	21°54.7'	+15.8'	83.2°	22°01.6'	+16.9'	83.6°	13
14	21°24.6'	+10.0'	80.2°	21°34.6'	+11.1'	80.6°	21°44.2'	+12.2'	81.0°	21°53.4'	+13.3'	81.4°	22°02.2'	+14.4'	81.8°	22°10.5'	+15.4'	82.2°	22°18.5'	+16.5'	82.6°	14
15	21°34.6'	+09.6'	79.1°	21°45.7'	+10.7'	79.5°	21°56.4'	+11.8'	79.9°	22°06.7'	+12.9'	80.3°	22°16.5'	+14.0'	80.7°	22°26.0'	+15.0'	81.1°	22°35.0'	+16.1'	81.6°	15
16	21°44.2'	+09.2'	78.1°	21°56.4'	+10.3'	78.5°	22°08.2'	+11.4'	78.9°	22°19.5'	+12.5'	79.3°	22°30.5'	+13.5'	79.7°	22°41.0'	+14.6'	80.1°	22°51.1'	+15.7'	80.5°	16
17	21°53.4'	+08.8'	77.0°	22°06.7'	+09.9'	77.4°	22°19.5'	+11.0'	77.8°	22°32.0'	+12.0'	78.2°	22°44.0'	+13.1'	78.6°	22°55.7'	+14.2'	79.0°	23°06.8'	+15.3'	79.5°	17
18	22°02.2'	+08.4'	76.0°	22°16.5'	+09.4'	76.4°	22°30.5'	+10.5'	76.8°	22°44.0'	+11.6'	77.2°	22°57.2'	+12.7'	77.6°	23°09.9'	+13.8'	78.0°	23°22.1'	+14.9'	78.4°	18
19	22°10.5'	+07.9'	74.9°	22°26.0'	+09.0'	75.3°	22°41.0'	+10.1'	75.7°	22°55.7'	+11.2'	76.1°	23°09.9'	+12.3'	76.5°	23°23.6'	+13.4'	76.9°	23°37.0'	+14.4'	77.4°	19
20	22°18.5'	+07.5'	73.8°	22°35.0'	+08.6'	74.2°	22°51.1'	+09.7'	74.6°	23°06.8'	+10.8'	75.0°	23°22.1'	+11.8'	75.4°	23°37.0'	+12.9'	75.9°	23°51.4'	+14.0'	76.3°	20
21	22°26.0'	+07.1'	72.7°	22°43.6'	+08.2'	73.1°	23°00.8'	+09.2'	73.5°	23°17.6'	+10.3'	74.0°	23°34.0'	+11.4'	74.4°	23°49.9'	+12.5'	74.8°	24°05.4'	+13.6'	75.2°	21
22																						

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

72° 288° LHA

Latitude SAME as Declination

72° 288° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	17°26.9'	+15.1'	94.5°	17°22.0'	+16.1'	94.8°	17°16.8'	+17.2'	95.1°	17°11.3'	+18.2'	95.4°	17°05.5'	+19.3'	95.7°	16°59.3'	+20.3'	96.0°	16°52.8'	+21.3'	96.3°	0
1	17°41.9'	+14.7'	93.5°	17°38.1'	+15.8'	93.8°	17°34.0'	+16.9'	94.1°	17°29.5'	+17.9'	94.4°	17°24.7'	+19.0'	94.7°	17°19.6'	+20.0'	95.1°	17°14.2'	+21.0'	95.4°	1
2	17°56.7'	+14.4'	92.5°	17°53.9'	+15.5'	92.8°	17°50.9'	+16.6'	93.1°	17°47.4'	+17.6'	93.4°	17°43.7'	+18.7'	93.7°	17°39.6'	+19.7'	94.1°	17°35.2'	+20.7'	94.4°	2
3	18°11.1'	+14.1'	91.4°	18°09.4'	+15.2'	91.8°	18°07.4'	+16.2'	92.1°	18°05.0'	+17.3'	92.4°	18°02.3'	+18.3'	92.7°	17°59.3'	+19.4'	93.1°	17°55.9'	+20.4'	93.4°	3
4	18°25.2'	+13.8'	90.4°	18°24.6'	+14.8'	90.7°	18°23.6'	+15.9'	91.1°	18°22.3'	+17.0'	91.4°	18°20.7'	+18.0'	91.7°	18°18.7'	+19.1'	92.1°	18°16.3'	+20.1'	92.4°	4
5	18°39.0'	+13.4'	89.4°	18°39.4'	+14.5'	89.7°	18°39.6'	+15.6'	90.1°	18°39.3'	+16.6'	90.4°	18°38.7'	+17.7'	90.7°	18°37.8'	+18.8'	91.1°	18°36.5'	+19.8'	91.4°	5
6	18°52.4'	+13.1'	88.4°	18°54.0'	+14.2'	88.7°	18°55.1'	+15.2'	89.0°	18°56.0'	+16.3'	89.4°	18°56.4'	+17.4'	89.7°	18°56.5'	+18.4'	90.1°	18°56.3'	+19.5'	90.4°	6
7	19°05.5'	+12.8'	87.3°	19°08.1'	+13.8'	87.7°	19°10.4'	+14.9'	88.0°	19°12.3'	+16.0'	88.4°	19°13.8'	+17.0'	88.7°	19°15.0'	+18.1'	89.1°	19°15.8'	+19.2'	89.4°	7
8	19°18.3'	+12.4'	86.3°	19°22.0'	+13.5'	86.6°	19°25.3'	+14.6'	87.0°	19°28.3'	+15.6'	87.3°	19°30.8'	+16.7'	87.7°	19°33.1'	+17.8'	88.1°	19°34.9'	+18.8'	88.4°	8
9	19°30.7'	+12.0'	85.3°	19°35.4'	+13.1'	85.6°	19°39.9'	+14.2'	86.0°	19°43.9'	+15.3'	86.3°	19°47.6'	+16.4'	86.7°	19°50.8'	+17.4'	87.0°	19°53.7'	+18.5'	87.4°	9
10	19°42.7'	+11.7'	84.2°	19°48.6'	+12.8'	84.6°	19°54.1'	+13.8'	84.9°	19°59.2'	+14.9'	85.3°	20°03.9'	+16.0'	85.7°	20°08.3'	+17.1'	86.0°	20°12.2'	+18.1'	86.4°	10
11	19°54.4'	+11.3'	83.2°	20°01.3'	+12.4'	83.5°	20°07.9'	+13.5'	83.9°	20°14.1'	+14.6'	84.3°	20°19.9'	+15.6'	84.6°	20°25.3'	+16.7'	85.0°	20°30.4'	+17.8'	85.4°	11
12	20°05.7'	+10.9'	82.1°	20°13.8'	+12.0'	82.5°	20°21.4'	+13.1'	82.9°	20°28.7'	+14.2'	83.2°	20°35.5'	+15.3'	83.6°	20°42.0'	+16.3'	84.0°	20°48.1'	+17.4'	84.4°	12
13	20°16.7'	+10.6'	81.1°	20°25.8'	+11.7'	81.4°	20°34.5'	+12.7'	81.8°	20°42.9'	+13.8'	82.2°	20°50.8'	+14.9'	82.6°	20°58.4'	+16.0'	82.9°	21°05.6'	+17.0'	83.3°	13
14	20°27.2'	+10.2'	80.0°	20°37.4'	+11.3'	80.4°	20°47.3'	+12.4'	80.8°	20°56.7'	+13.4'	81.1°	21°05.7'	+14.5'	81.5°	21°14.4'	+15.6'	81.9°	21°22.6'	+16.7'	82.3°	14
15	20°37.4'	+09.8'	79.0°	20°48.7'	+10.9'	79.4°	20°59.6'	+12.0'	79.7°	21°10.1'	+13.1'	80.1°	21°20.2'	+14.1'	80.5°	21°30.0'	+15.2'	80.9°	21°39.3'	+16.3'	81.3°	15
16	20°47.3'	+09.4'	77.9°	20°59.6'	+10.5'	78.3°	21°11.6'	+11.6'	78.7°	21°23.2'	+12.7'	79.1°	21°34.4'	+13.7'	79.4°	21°45.2'	+14.8'	79.8°	21°55.5'	+15.9'	80.2°	16
17	20°56.7'	+09.0'	76.9°	21°10.1'	+10.1'	77.2°	21°23.2'	+11.2'	77.6°	21°35.8'	+12.3'	78.0°	21°48.1'	+13.3'	78.4°	22°00.0'	+14.4'	78.8°	22°11.4'	+15.5'	79.2°	17
18	21°05.7'	+08.6'	75.8°	21°20.2'	+09.7'	76.2°	21°34.4'	+10.8'	76.6°	21°48.1'	+11.9'	77.0°	22°01.5'	+12.9'	77.3°	22°14.4'	+14.0'	77.7°	22°26.9'	+15.1'	78.1°	18
19	21°14.4'	+08.2'	74.7°	21°30.0'	+09.3'	75.1°	21°45.2'	+10.4'	75.5°	22°00.0'	+11.5'	75.9°	22°14.4'	+12.5'	76.3°	22°28.4'	+13.6'	76.7°	22°42.0'	+14.7'	77.1°	19
20	21°22.6'	+07.8'	73.7°	21°39.3'	+08.9'	74.1°	21°55.5'	+10.0'	74.4°	22°11.4'	+11.0'	74.8°	22°26.9'	+12.1'	75.2°	22°42.0'	+13.2'	75.6°	22°56.7'	+14.3'	76.0°	20
21	21°30.4'	+07.4'	72.6°	21°48.2'	+08.5'	73.0°	22°05.5'	+09.6'	73.3°	22°22.5'	+10.6'	73.8°	22°39.0'	+11.7'	74.2°	22°55.2'	+12.8'	74.6°	23°11.0'	+13.8'	75.0°	21
22	21°37.9'	+07.0'	71.6°	21°56.7'	+08.1'	71.9°	22°15.1'	+09.1'	72.3°	22°33.1'	+10.2'	72.7°	22°50.7'	+11.3'	73.1°	23°08.0'	+12.3'	73.5°	23°24.8'	+13.4'	73.9°	22
23	21°44.9'	+06.6'	70.5°	22°04.8'	+07.7'	70.9°	22°24.2'	+08.7'	71.2°	22°43.3'	+09.8'	71.6°	23°02.0'	+10.8'	72.0°	23°20.3'	+11.9'	72.5°	23°38.2'	+13.0'	72.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

72° 288° LHA

Latitude SAME as Declination

72° 288° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

73° 287° LHA

Latitude SAME as Declination

73° 287° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	16°28.8'	+15.0'	94.2°	16°24.2'	+16.0'	94.5°	16°19.4'	+17.1'	94.8°	16°14.2'	+18.1'	95.1°	16°08.7'	+19.2'	95.4°	16°02.9'	+20.2'	95.7°	15°56.8'	+21.2'	96.0°	0
1	16°43.8'	+14.7'	93.2°	16°40.3'	+15.8'	93.5°	16°36.4'	+16.8'	93.8°	16°32.3'	+17.8'	94.1°	16°27.8'	+18.9'	94.4°	16°23.1'	+19.9'	94.7°	16°18.0'	+20.9'	95.0°	1
2	16°58.5'	+14.4'	92.2°	16°56.0'	+15.5'	92.5°	16°53.3'	+16.5'	92.8°	16°50.1'	+17.6'	93.1°	16°46.7'	+18.6'	93.4°	16°43.0'	+19.6'	93.7°	16°38.9'	+20.7'	94.0°	2
3	17°12.9'	+14.1'	91.2°	17°11.5'	+15.2'	91.5°	17°09.8'	+16.2'	91.8°	17°07.7'	+17.3'	92.1°	17°05.3'	+18.3'	92.4°	17°02.6'	+19.4'	92.7°	16°59.6'	+20.4'	93.0°	3
4	17°27.0'	+13.8'	90.2°	17°26.6'	+14.8'	90.5°	17°26.0'	+15.9'	90.8°	17°25.0'	+17.0'	91.1°	17°23.6'	+18.0'	91.4°	17°22.0'	+19.1'	91.7°	17°20.0'	+20.1'	92.1°	4
5	17°40.8'	+13.5'	89.2°	17°41.5'	+14.5'	89.5°	17°41.9'	+15.6'	89.8°	17°41.9'	+16.7'	90.1°	17°41.7'	+17.7'	90.4°	17°41.0'	+18.8'	90.7°	17°40.1'	+19.8'	91.1°	5
6	17°54.2'	+13.1'	88.1°	17°56.0'	+14.2'	88.5°	17°57.5'	+15.3'	88.8°	17°58.6'	+16.3'	89.1°	17°59.4'	+17.4'	89.4°	17°59.8'	+18.4'	89.7°	17°59.9'	+19.5'	90.1°	6
7	18°07.4'	+12.8'	87.1°	18°10.2'	+13.9'	87.4°	18°12.8'	+15.0'	87.8°	18°14.9'	+16.0'	88.1°	18°16.8'	+17.1'	88.4°	18°18.2'	+18.1'	88.7°	18°19.4'	+19.2'	89.1°	7
8	18°20.2'	+12.5'	86.1°	18°24.1'	+13.6'	86.4°	18°27.7'	+14.6'	86.7°	18°30.9'	+15.7'	87.1°	18°33.8'	+16.8'	87.4°	18°36.4'	+17.8'	87.7°	18°38.6'	+18.9'	88.1°	8
9	18°32.7'	+12.1'	85.0°	18°37.7'	+13.2'	85.4°	18°42.3'	+14.3'	85.7°	18°46.6'	+15.4'	86.1°	18°50.6'	+16.4'	86.4°	18°54.2'	+17.5'	86.7°	18°57.4'	+18.5'	87.1°	9
10	18°44.8'	+11.8'	84.0°	18°50.9'	+12.9'	84.3°	18°56.6'	+14.0'	84.7°	19°02.0'	+15.0'	85.0°	19°07.0'	+16.1'	85.4°	19°11.7'	+17.2'	85.7°	19°16.0'	+18.2'	86.1°	10
11	18°56.6'	+11.5'	83.0°	19°03.8'	+12.5'	83.3°	19°10.6'	+13.6'	83.7°	19°17.0'	+14.7'	84.0°	19°23.1'	+15.7'	84.4°	19°28.8'	+16.8'	84.7°	19°34.2'	+17.9'	85.1°	11
12	19°08.1'	+11.1'	81.9°	19°16.3'	+12.2'	82.3°	19°24.2'	+13.3'	82.6°	19°31.7'	+14.3'	83.0°	19°38.9'	+15.4'	83.3°	19°45.6'	+16.5'	83.7°	19°52.0'	+17.5'	84.0°	12
13	19°19.2'	+10.8'	80.9°	19°28.5'	+11.8'	81.2°	19°37.4'	+12.9'	81.6°	19°46.0'	+14.0'	81.9°	19°54.3'	+15.0'	82.3°	20°02.1'	+16.1'	82.7°	20°09.6'	+17.2'	83.0°	13
14	19°29.9'	+10.4'	79.9°	19°40.3'	+11.5'	80.2°	19°50.3'	+12.5'	80.6°	20°00.0'	+13.6'	80.9°	20°09.3'	+14.7'	81.3°	20°18.2'	+15.7'	81.6°	20°26.7'	+16.8'	82.0°	14
15	19°40.3'	+10.0'	78.8°	19°51.8'	+11.1'	79.2°	20°02.9'	+12.2'	79.5°	20°13.6'	+13.2'	79.9°	20°24.0'	+14.3'	80.2°	20°34.0'	+15.4'	80.6°	20°43.6'	+16.4'	81.0°	15
16	19°50.3'	+09.7'	77.8°	20°02.9'	+10.7'	78.1°	20°15.1'	+11.8'	78.5°	20°26.9'	+12.9'	78.8°	20°38.3'	+13.9'	79.2°	20°49.3'	+15.0'	79.6°	21°00.0'	+16.1'	80.0°	16
17	20°00.0'	+09.3'	76.7°	20°13.6'	+10.4'	77.1°	20°26.9'	+11.4'	77.4°	20°39.7'	+12.5'	77.8°	20°52.2'	+13.6'	78.2°	21°04.4'	+14.6'	78.5°	21°16.1'	+15.7'	78.9°	17
18	20°09.3'	+08.9'	75.7°	20°24.0'	+10.0'	76.0°	20°38.3'	+11.0'	76.4°	20°52.2'	+12.1'	76.7°	21°05.8'	+13.2'	77.1°	21°19.0'	+14.2'	77.5°	21°31.8'	+15.3'	77.9°	18
19	20°18.2'	+08.5'	74.6°	20°34.0'	+09.6'	75.0°	20°49.3'	+10.7'	75.3°	21°04.4'	+11.7'	75.7°	21°19.0'	+12.8'	76.1°	21°33.2'	+13.9'	76.5°	21°47.1'	+14.9'	76.8°	19
20	20°26.7'	+08.2'	73.5°	20°43.6'	+09.2'	73.9°	21°00.0'	+10.3'	74.3°	21°16.1'	+11.3'	74.6°	21°31.8'	+12.4'	75.0°	21°47.1'	+13.5'	75.4°	22°02.0'	+14.5'	75.8°	20
21	20°34.9'	+07.8'	72.5°	20°52.8'	+08.8'	72.8°	21°10.3'	+09.9'	73.2°	21°27.4'	+10.9'	73.6°	21°44.2'	+12.0'	74.0°	22°00.5'	+13.1'	74.4°	22°16.5'	+14.1'	74.8°	21
22																						

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

74° 286° LHA

Latitude SAME as Declination

74° 286° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	15°30.8'	+14.9'	94.0°	15°26.5'	+16.0'	94.2°	15°21.9'	+17.0'	94.5°	15°17.0'	+18.1'	94.8°	15°11.8'	+19.1'	95.1°	15°06.4'	+20.1'	95.3°	15°00.7'	+21.1'	95.6°	0
1	15°45.7'	+14.6'	93.0°	15°42.4'	+15.7'	93.2°	15°38.9'	+16.7'	93.5°	15°35.1'	+17.8'	93.8°	15°30.9'	+18.8'	94.1°	15°26.5'	+19.8'	94.4°	15°21.8'	+20.9'	94.6°	1
2	16°00.3'	+14.4'	92.0°	15°58.1'	+15.4'	92.2°	15°55.6'	+16.5'	92.5°	15°52.8'	+17.5'	92.8°	15°49.8'	+18.6'	93.1°	15°46.4'	+19.6'	93.4°	15°42.7'	+20.6'	93.7°	2
3	16°14.7'	+14.1'	90.9°	16°13.6'	+15.1'	91.2°	16°12.1'	+16.2'	91.5°	16°10.4'	+17.2'	91.8°	16°08.3'	+18.3'	92.1°	16°06.0'	+19.3'	92.4°	16°03.3'	+20.3'	92.7°	3
4	16°28.8'	+13.8'	89.9°	16°28.7'	+14.8'	90.2°	16°28.3'	+15.9'	90.5°	16°27.6'	+17.0'	90.8°	16°26.6'	+18.0'	91.1°	16°25.3'	+19.0'	91.4°	16°23.6'	+20.1'	91.7°	4
5	16°42.6'	+13.5'	88.9°	16°43.5'	+14.6'	89.2°	16°44.2'	+15.6'	89.5°	16°44.6'	+16.7'	89.8°	16°44.6'	+17.7'	90.1°	16°44.3'	+18.8'	90.4°	16°43.7'	+19.8'	90.7°	5
6	16°56.0'	+13.2'	87.9°	16°58.1'	+14.2'	88.2°	16°59.8'	+15.3'	88.5°	17°01.2'	+16.4'	88.8°	17°02.3'	+17.4'	89.1°	17°03.1'	+18.5'	89.4°	17°03.5'	+19.5'	89.7°	6
7	17°09.2'	+12.9'	86.9°	17°12.3'	+13.9'	87.2°	17°15.1'	+15.0'	87.5°	17°17.6'	+16.1'	87.8°	17°19.7'	+17.1'	88.1°	17°21.5'	+18.2'	88.4°	17°23.0'	+19.2'	88.7°	7
8	17°22.1'	+12.6'	85.9°	17°26.3'	+13.6'	86.2°	17°30.1'	+14.7'	86.5°	17°33.7'	+15.8'	86.8°	17°36.8'	+16.8'	87.1°	17°39.7'	+17.9'	87.4°	17°42.2'	+18.9'	87.7°	8
9	17°34.7'	+12.2'	84.8°	17°39.9'	+13.3'	85.1°	17°44.8'	+14.4'	85.5°	17°49.4'	+15.4'	85.8°	17°53.7'	+16.5'	86.1°	17°57.6'	+17.6'	86.4°	18°01.1'	+18.6'	86.8°	9
10	17°46.9'	+11.9'	83.8°	17°53.2'	+13.0'	84.1°	17°59.2'	+14.1'	84.4°	18°04.9'	+15.1'	84.8°	18°10.2'	+16.2'	85.1°	18°15.1'	+17.2'	85.4°	18°19.7'	+18.3'	85.8°	10
11	17°58.8'	+11.6'	82.8°	18°06.2'	+12.7'	83.1°	18°13.3'	+13.7'	83.4°	18°20.0'	+14.8'	83.7°	18°26.3'	+15.9'	84.1°	18°32.4'	+16.9'	84.4°	18°38.0'	+18.0'	84.7°	11
12	18°10.4'	+11.3'	81.7°	18°18.9'	+12.3'	82.1°	18°27.0'	+13.4'	82.4°	18°34.8'	+14.5'	82.7°	18°42.2'	+15.5'	83.1°	18°49.3'	+16.6'	83.4°	18°56.0'	+17.6'	83.7°	12
13	18°21.7'	+10.9'	80.7°	18°31.2'	+12.0'	81.0°	18°40.4'	+13.1'	81.4°	18°49.2'	+14.1'	81.7°	18°57.7'	+15.2'	82.0°	19°05.9'	+16.3'	82.4°	19°13.6'	+17.3'	82.7°	13
14	18°32.6'	+10.6'	79.7°	18°43.2'	+11.7'	80.0°	18°53.5'	+12.7'	80.3°	19°03.4'	+13.8'	80.7°	19°12.9'	+14.8'	81.0°	19°22.1'	+15.9'	81.4°	19°30.9'	+17.0'	81.7°	14
15	18°43.2'	+10.2'	78.6°	18°54.9'	+11.3'	79.0°	19°06.2'	+12.4'	79.3°	19°17.2'	+13.4'	79.6°	19°27.8'	+14.5'	80.0°	19°38.0'	+15.6'	80.3°	19°47.9'	+16.6'	80.7°	15
16	18°53.5'	+09.9'	77.6°	19°06.2'	+11.0'	77.9°	19°18.6'	+12.0'	78.3°	19°30.6'	+13.1'	78.6°	19°42.3'	+14.1'	79.0°	19°53.6'	+15.2'	79.3°	20°04.5'	+16.3'	79.7°	16
17	19°03.4'	+09.5'	76.5°	19°17.2'	+10.6'	76.9°	19°30.6'	+11.7'	77.2°	19°43.7'	+12.7'	77.6°	19°56.4'	+13.8'	77.9°	20°08.8'	+14.8'	78.3°	20°20.8'	+15.9'	78.6°	17
18	19°12.9'	+09.2'	75.5°	19°27.8'	+10.2'	75.8°	19°42.3'	+11.3'	76.2°	19°56.4'	+12.4'	76.5°	20°10.2'	+13.4'	76.9°	20°23.6'	+14.5'	77.3°	20°36.7'	+15.5'	77.6°	18
19	19°22.1'	+08.8'	74.5°	19°38.0'	+09.9'	74.8°	19°53.6'	+10.9'	75.1°	20°08.8'	+12.0'	75.5°	20°23.6'	+13.1'	75.9°	20°38.1'	+14.1'	76.2°	20°52.2'	+15.2'	76.6°	19
20	19°30.9'	+08.5'	73.4°	19°47.9'	+09.5'	73.7°	20°04.5'	+10.6'	74.1°	20°20.8'	+11.6'	74.5°	20°36.7'	+12.7'	74.8°	20°52.2'	+13.7'	75.2°	21°07.4'	+14.8'	75.5°	20
21	19°39.4'	+08.1'	72.4°	19°57.4'	+09.1'	72.7°	20°15.1'	+10.2'	73.0°	20°32.4'	+11.2'	73.4°	20°49.4'	+12.3'	73.8°	21°05.9'	+13.3'	74.1°	21°22.2'	+14.4'	74.5°	21
22	19°47.5'	+07.7'	71.3°	20°06.6'	+08.8'	71.6°	20°25.3'	+09.8'	72.0°	20°43.7'	+10.9'	72.4°	21°01.7'	+11.9'	72.7°	21°19.3'	+13.0'	73.1°	21°36.6'	+14.0'	73.5°	22
23	19°55.2'	+07.4'	70.2°	20°15.3'	+08.4'	70.6°	20°35.1'	+09.4'	70.9°	20°54.5'	+10.5'	71.3°	21°13.6'	+11.5'	71.7°	21°32.3'	+12.6'	72.0°	21°50.6'	+13.6'	72.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

74° 286° LHA

Latitude SAME as Declination

74° 286° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

75° 285° LHA

Latitude SAME as Declination

75° 285° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	14°32.7'	+14.9'	93.7°	14°28.7'	+15.9'	94.0°	14°24.4'	+17.0'	94.2°	14°19.8'	+18.0'	94.5°	14°15.0'	+19.0'	94.7°	14°09.9'	+20.0'	95.0°	14°04.6'	+21.0'	95.2°	0
1	14°47.5'	+14.6'	92.7°	14°44.6'	+15.7'	93.0°	14°41.3'	+16.7'	93.2°	14°37.8'	+17.7'	93.5°	14°34.0'	+18.8'	93.8°	14°29.9'	+19.8'	94.0°	14°25.6'	+20.8'	94.3°	1
2	15°02.1'	+14.3'	91.7°	15°00.2'	+15.4'	92.0°	14°58.0'	+16.4'	92.2°	14°55.5'	+17.5'	92.5°	14°52.8'	+18.5'	92.8°	14°49.7'	+19.5'	93.0°	14°46.4'	+20.6'	93.3°	2
3	15°16.5'	+14.1'	90.7°	15°15.6'	+15.1'	91.0°	15°14.5'	+16.2'	91.2°	15°13.0'	+17.2'	91.5°	15°11.3'	+18.3'	91.8°	15°09.3'	+19.3'	92.1°	15°07.0'	+20.3'	92.3°	3
4	15°30.6'	+13.8'	89.7°	15°30.7'	+14.9'	90.0°	15°30.6'	+15.9'	90.2°	15°30.2'	+17.0'	90.5°	15°29.5'	+18.0'	90.8°	15°28.6'	+19.0'	91.1°	15°27.3'	+20.1'	91.4°	4
5	15°44.4'	+13.5'	88.7°	15°45.6'	+14.6'	89.0°	15°46.5'	+15.6'	89.2°	15°47.2'	+16.7'	89.5°	15°47.5'	+17.7'	89.8°	15°47.6'	+18.8'	90.1°	15°47.3'	+19.8'	90.4°	5
6	15°57.9'	+13.2'	87.7°	16°00.2'	+14.3'	88.0°	16°02.2'	+15.3'	88.2°	16°03.9'	+16.4'	88.5°	16°05.2'	+17.4'	88.8°	16°06.3'	+18.5'	89.1°	16°07.1'	+19.5'	89.4°	6
7	16°11.1'	+12.9'	86.7°	16°14.5'	+14.0'	86.9°	16°17.5'	+15.1'	87.2°	16°20.3'	+16.1'	87.5°	16°22.7'	+17.2'	87.8°	16°24.8'	+18.2'	88.1°	16°26.6'	+19.2'	88.4°	7
8	16°24.1'	+12.6'	85.6°	16°28.5'	+13.7'	85.9°	16°32.6'	+14.8'	86.2°	16°36.4'	+15.8'	86.5°	16°39.9'	+16.9'	86.8°	16°43.0'	+17.9'	87.1°	16°45.9'	+19.0'	87.4°	8
9	16°36.7'	+12.4'	84.6°	16°42.2'	+13.4'	84.9°	16°47.3'	+14.5'	85.2°	16°52.2'	+15.5'	85.5°	16°56.7'	+16.6'	85.8°	17°00.9'	+17.6'	86.1°	17°04.8'	+18.7'	86.4°	9
10	16°49.1'	+12.0'	83.6°	16°55.6'	+13.1'	83.9°	17°01.8'	+14.2'	84.2°	17°07.7'	+15.2'	84.5°	17°13.3'	+16.3'	84.8°	17°18.6'	+17.3'	85.1°	17°23.5'	+18.4'	85.4°	10
11	17°01.1'	+11.7'	82.6°	17°08.7'	+12.8'	82.9°	17°16.0'	+13.9'	83.2°	17°23.0'	+14.9'	83.5°	17°29.6'	+16.0'	83.8°	17°35.9'	+17.0'	84.1°	17°41.9'	+18.1'	84.4°	11
12	17°12.8'	+11.4'	81.5°	17°21.5'	+12.5'	81.9°	17°29.9'	+13.6'	82.2°	17°37.9'	+14.6'	82.5°	17°45.6'	+15.7'	82.8°	17°52.9'	+16.7'	83.1°	18°00.0'	+17.8'	83.4°	12
13	17°24.3'	+11.1'	80.5°	17°34.0'	+12.2'	80.8°	17°43.4'	+13.2'	81.1°	17°52.5'	+14.3'	81.5°	18°01.2'	+15.3'	81.8°	18°09.6'	+16.4'	82.1°	18°17.7'	+17.4'	82.4°	13
14	17°35.4'	+10.8'	79.5°	17°46.2'	+11.9'	79.8°	17°56.6'	+12.9'	80.1°	18°06.8'	+14.0'	80.4°	18°16.6'	+15.0'	80.8°	18°26.0'	+16.1'	81.1°	18°35.2'	+17.1'	81.4°	14
15	17°46.2'	+10.5'	78.5°	17°58.0'	+11.5'	78.8°	18°09.5'	+12.6'	79.1°	18°20.7'	+13.6'	79.4°	18°31.6'	+14.7'	79.7°	18°42.1'	+15.7'	80.1°	18°52.3'	+16.8'	80.4°	15
16	17°56.6'	+10.1'	77.4°	18°09.5'	+11.2'	77.7°	18°22.1'	+12.2'	78.1°	18°34.4'	+13.3'	78.4°	18°46.3'	+14.4'	78.7°	18°57.9'	+15.4'	79.1°	19°09.1'	+16.5'	79.4°	16
17	18°06.8'	+09.8'	76.4°	18°20.7'	+10.9'	76.7°	18°34.4'	+11.9'	77.0°	18°47.7'	+13.0'	77.4°	19°00.6'	+14.0'	77.7°	19°13.3'	+15.1'	78.0°	19°25.5'	+16.1'	78.4°	17
18	18°16.6'	+09.5'	75.3°	18°31.6'	+10.5'	75.7°	18°46.3'	+11.6'	76.0°	19°00.6'	+12.6'	76.3°	19°14.7'	+13.7'	76.7°	19°28.3'	+14.7'	77.0°	19°41.6'	+15.8'	77.3°	18
19	18°26.0'	+09.1'	74.3°	18°42.1'	+10.2'	74.6°	18°57.9'	+11.2'	75.0°	19°13.3'	+12.3'	75.3°	19°28.3'	+13.3'	75.6°	19°43.0'	+14.4'	76.0°	19°57.4'	+15.4'	76.3°	19
20	18°35.2'	+08.8'	73.3°	18°52.3'	+09.8'	73.6°	19°09.1'	+10.9'	73.9°	19°25.5'	+11.9'	74.3°	19°41.6'	+13.0'	74.6°	19°57.4'	+14.0'	74.9°	20°12.8'	+15.0'	75.3°	20
21	18°43.9'	+08.4'	72.2°	19°02.1'	+09.5'	72.5°	19°19.9'	+10.5'	72.9°	19°37.4'	+11.6'	73.2°	19°54.6'	+12.6'	73.6°	20°11.4'	+13.6'	73.9°	20°27.9'	+14.7'	74.3°	21
22																						

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

76° 284° LHA

Latitude SAME as Declination

76° 284° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	13°34.6'	+14.8'	93.5°	13°30.8'	+15.9'	93.7°	13°26.8'	+16.9'	93.9°	13°22.6'	+17.9'	94.2°	13°18.1'	+18.9'	94.4°	13°13.4'	+20.0'	94.6°	13°08.4'	+21.0'	94.9°	0
1	13°49.4'	+14.6'	92.5°	13°46.7'	+15.6'	92.7°	13°43.7'	+16.7'	92.9°	13°40.5'	+17.7'	93.2°	13°37.1'	+18.7'	93.4°	13°33.3'	+19.7'	93.7°	13°29.4'	+20.7'	93.9°	1
2	14°03.9'	+14.3'	91.5°	14°02.3'	+15.4'	91.7°	14°00.4'	+16.4'	92.0°	13°58.2'	+17.4'	92.2°	13°55.8'	+18.5'	92.5°	13°53.1'	+19.5'	92.7°	13°50.1'	+20.5'	92.9°	2
3	14°18.3'	+14.1'	90.5°	14°17.7'	+15.1'	90.7°	14°16.8'	+16.2'	91.0°	14°15.6'	+17.2'	91.2°	14°14.2'	+18.2'	91.5°	14°12.6'	+19.3'	91.7°	14°10.6'	+20.3'	92.0°	3
4	14°32.3'	+13.8'	89.4°	14°32.8'	+14.9'	89.7°	14°33.0'	+15.9'	90.0°	14°32.8'	+17.0'	90.2°	14°32.5'	+18.0'	90.5°	14°31.8'	+19.0'	90.7°	14°30.9'	+20.0'	91.0°	4
5	14°46.2'	+13.6'	88.4°	14°47.6'	+14.6'	88.7°	14°48.9'	+15.7'	89.0°	14°49.8'	+16.7'	89.2°	14°50.5'	+17.7'	89.5°	14°50.8'	+18.8'	89.8°	14°51.0'	+19.8'	90.0°	5
6	14°59.7'	+13.3'	87.4°	15°02.3'	+14.3'	87.7°	15°04.5'	+15.4'	88.0°	15°06.5'	+16.4'	88.2°	15°08.2'	+17.5'	88.5°	15°09.6'	+18.5'	88.8°	15°10.7'	+19.5'	89.1°	6
7	15°13.0'	+13.0'	86.4°	15°16.6'	+14.1'	86.7°	15°19.9'	+15.1'	87.0°	15°22.9'	+16.2'	87.2°	15°25.7'	+17.2'	87.5°	15°28.1'	+18.2'	87.8°	15°30.3'	+19.3'	88.1°	7
8	15°26.0'	+12.7'	85.4°	15°30.7'	+13.8'	85.7°	15°35.0'	+14.8'	86.0°	15°39.1'	+15.9'	86.2°	15°42.9'	+16.9'	86.5°	15°46.4'	+18.0'	86.8°	15°49.6'	+19.0'	87.1°	8
9	15°38.8'	+12.5'	84.4°	15°44.5'	+13.5'	84.7°	15°49.9'	+14.6'	85.0°	15°55.0'	+15.6'	85.2°	15°59.8'	+16.7'	85.5°	16°04.4'	+17.7'	85.8°	16°08.6'	+18.7'	86.1°	9
10	15°51.2'	+12.2'	83.4°	15°58.0'	+13.2'	83.7°	16°04.4'	+14.3'	84.0°	16°10.6'	+15.3'	84.2°	16°16.5'	+16.4'	84.5°	16°22.1'	+17.4'	84.8°	16°27.3'	+18.5'	85.1°	10
11	16°03.4'	+11.9'	82.4°	16°11.2'	+12.9'	82.7°	16°18.7'	+14.0'	82.9°	16°26.0'	+15.0'	83.2°	16°32.9'	+16.1'	83.5°	16°39.5'	+17.1'	83.8°	16°45.8'	+18.2'	84.1°	11
12	16°15.3'	+11.6'	81.3°	16°24.2'	+12.6'	81.6°	16°32.7'	+13.7'	81.9°	16°41.0'	+14.8'	82.2°	16°49.0'	+15.8'	82.5°	16°56.6'	+16.8'	82.8°	17°04.0'	+17.9'	83.1°	12
13	16°26.9'	+11.3'	80.3°	16°36.8'	+12.3'	80.6°	16°46.4'	+13.4'	80.9°	16°55.8'	+14.5'	81.2°	17°04.8'	+15.5'	81.5°	17°13.5'	+16.5'	81.8°	17°21.8'	+17.6'	82.1°	13
14	16°38.2'	+11.0'	79.3°	16°49.1'	+12.0'	79.6°	16°59.8'	+13.1'	79.9°	17°10.2'	+14.1'	80.2°	17°20.3'	+15.2'	80.5°	17°30.0'	+16.2'	80.8°	17°39.4'	+17.3'	81.1°	14
15	16°49.1'	+10.7'	78.3°	17°01.2'	+11.7'	78.6°	17°12.9'	+12.8'	78.9°	17°24.4'	+13.8'	79.2°	17°35.5'	+14.9'	79.5°	17°46.3'	+15.9'	79.8°	17°56.7'	+17.0'	80.1°	15
16	16°59.8'	+10.4'	77.2°	17°12.9'	+11.4'	77.5°	17°25.7'	+12.5'	77.8°	17°38.2'	+13.5'	78.2°	17°50.3'	+14.6'	78.5°	18°02.2'	+15.6'	78.8°	18°13.7'	+16.7'	79.1°	16
17	17°10.2'	+10.1'	76.2°	17°24.4'	+11.1'	76.5°	17°38.2'	+12.2'	76.8°	17°51.7'	+13.2'	77.1°	18°04.9'	+14.2'	77.4°	18°17.8'	+15.3'	77.8°	18°30.3'	+16.3'	78.1°	17
18	17°20.3'	+09.7'	75.2°	17°35.5'	+10.8'	75.5°	17°50.3'	+11.8'	75.8°	18°04.9'	+12.9'	76.1°	18°19.2'	+13.9'	76.4°	18°33.1'	+15.0'	76.8°	18°46.7'	+16.0'	77.1°	18
19	17°30.0'	+09.4'	74.1°	17°46.3'	+10.5'	74.5°	18°02.2'	+11.5'	74.8°	18°17.8'	+12.5'	75.1°	18°33.1'	+13.6'	75.4°	18°48.0'	+14.6'	75.7°	19°02.7'	+15.7'	76.1°	19
20	17°39.4'	+09.1'	73.1°	17°56.7'	+10.1'	73.4°	18°13.7'	+11.2'	73.7°	18°30.3'	+12.2'	74.0°	18°46.7'	+13.2'	74.4°	19°02.7'	+14.3'	74.7°	19°18.3'	+15.3'	75.0°	20
21	17°48.5'	+08.8'	72.1°	18°06.8'	+09.8'	72.4°	18°24.9'	+10.8'	72.7°	18°42.5'	+11.9'	73.0°	19°00.0'	+12.9'	73.3°	19°16.9'	+13.9'	73.7°	19°33.6'	+15.0'	74.0°	21
22	17°57.3'	+08.4'	71.0°	18°16.6'	+09.5'	71.3°	18°35.7'	+10.5'	71.7°	18°54.4'	+11.5'	72.0°	19°12.8'	+12.6'	72.3°	19°30.9'	+13.6'	72.6°	19°48.6'	+14.6'	73.0°	22
23	18°05.7'	+08.1'	70.0°	18°26.1'	+09.1'	70.3°	18°46.2'	+10.1'	70.6°	19°05.9'	+11.2'	70.9°	19°25.4'	+12.2'	71.3°	19°44.5'	+13.2'	71.6°	20°03.2'	+14.3'	72.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

76° 284° LHA

Latitude SAME as Declination

76° 284° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

77° 283° LHA

Latitude SAME as Declination

77° 283° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	12°36.4'	+14.8'	93.2°	12°33.0'	+15.8'	93.4°	12°29.3'	+16.8'	93.6°	12°25.4'	+17.9'	93.9°	12°21.2'	+18.9'	94.1°	12°16.8'	+19.9'	94.3°	12°12.2'	+20.9'	94.5°	0
1	12°51.2'	+14.5'	92.2°	12°48.8'	+15.6'	92.4°	12°46.1'	+16.6'	92.7°	12°43.2'	+17.6'	92.9°	12°40.1'	+18.7'	93.1°	12°36.7'	+19.7'	93.3°	12°33.1'	+20.7'	93.6°	1
2	13°05.7'	+14.3'	91.2°	13°04.4'	+15.4'	91.4°	13°02.7'	+16.4'	91.7°	13°00.9'	+17.4'	91.9°	12°58.7'	+18.4'	92.1°	12°56.4'	+19.5'	92.4°	12°53.8'	+20.5'	92.6°	2
3	13°20.1'	+14.1'	90.2°	13°19.7'	+15.1'	90.4°	13°19.1'	+16.2'	90.7°	13°18.3'	+17.2'	90.9°	13°17.2'	+18.2'	91.2°	13°15.9'	+19.2'	91.4°	13°14.3'	+20.3'	91.6°	3
4	13°34.1'	+13.8'	89.2°	13°34.8'	+14.9'	89.5°	13°35.3'	+15.9'	89.7°	13°35.5'	+17.0'	89.9°	13°35.4'	+18.0'	90.2°	13°35.1'	+19.0'	90.4°	13°34.5'	+20.0'	90.7°	4
5	13°48.0'	+13.6'	88.2°	13°49.7'	+14.6'	88.5°	13°51.2'	+15.7'	88.7°	13°52.4'	+16.7'	88.9°	13°53.4'	+17.8'	89.2°	13°54.1'	+18.8'	89.4°	13°54.6'	+19.8'	89.7°	5
6	14°01.6'	+13.3'	87.2°	14°04.4'	+14.4'	87.5°	14°06.9'	+15.4'	87.7°	14°09.2'	+16.5'	88.0°	14°11.2'	+17.5'	88.2°	14°12.9'	+18.5'	88.5°	14°14.4'	+19.6'	88.7°	6
7	14°14.9'	+13.1'	86.2°	14°18.7'	+14.1'	86.5°	14°22.3'	+15.2'	86.7°	14°25.6'	+16.2'	87.0°	14°28.7'	+17.3'	87.2°	14°31.4'	+18.3'	87.5°	14°33.9'	+19.3'	87.7°	7
8	14°28.0'	+12.8'	85.2°	14°32.9'	+13.9'	85.5°	14°37.5'	+14.9'	85.7°	14°41.9'	+16.0'	86.0°	14°45.9'	+17.0'	86.2°	14°49.7'	+18.0'	86.5°	14°53.3'	+19.1'	86.8°	8
9	14°40.8'	+12.6'	84.2°	14°46.8'	+13.6'	84.4°	14°52.4'	+14.7'	84.7°	14°57.8'	+15.7'	85.0°	15°03.0'	+16.8'	85.2°	15°07.8'	+17.8'	85.5°	15°12.3'	+18.8'	85.8°	9
10	14°53.4'	+12.3'	83.2°	15°00.4'	+13.4'	83.4°	15°07.1'	+14.4'	83.7°	15°13.5'	+15.4'	84.0°	15°19.7'	+16.5'	84.2°	15°25.6'	+17.5'	84.5°	15°31.2'	+18.6'	84.8°	10
11	15°05.7'	+12.0'	82.2°	15°13.7'	+13.1'	82.4°	15°21.5'	+14.1'	82.7°	15°29.0'	+15.2'	83.0°	15°36.2'	+16.2'	83.2°	15°43.1'	+17.3'	83.5°	15°49.7'	+18.3'	83.8°	11
12	15°17.7'	+11.8'	81.1°	15°26.8'	+12.8'	81.4°	15°35.6'	+13.9'	81.7°	15°44.2'	+14.9'	82.0°	15°52.4'	+15.9'	82.2°	16°00.4'	+17.0'	82.5°	16°08.0'	+18.0'	82.8°	12
13	15°29.5'	+11.5'	80.1°	15°39.6'	+12.5'	80.4°	15°49.5'	+13.6'	80.7°	15°59.1'	+14.6'	81.0°	16°08.4'	+15.7'	81.2°	16°17.3'	+16.7'	81.5°	16°26.0'	+17.7'	81.8°	13
14	15°41.0'	+11.2'	79.1°	15°52.2'	+12.2'	79.4°	16°03.1'	+13.3'	79.7°	16°13.7'	+14.3'	80.0°	16°24.0'	+15.4'	80.2°	16°34.0'	+16.4'	80.5°	16°43.7'	+17.4'	80.8°	14
15	15°52.2'	+10.9'	78.1°	16°04.4'	+12.0'	78.4°	16°16.4'	+13.0'	78.7°	16°28.0'	+14.0'	78.9°	16°39.4'	+15.1'	79.2°	16°50.4'	+16.1'	79.5°	17°01.2'	+17.1'	79.8°	15
16	16°03.1'	+10.6'	77.1°	16°16.4'	+11.7'	77.3°	16°29.4'	+12.7'	77.6°	16°42.1'	+13.7'	77.9°	16°54.5'	+14.8'	78.2°	17°06.6'	+15.8'	78.5°	17°18.3'	+16.8'	78.8°	16
17	16°13.7'	+10.3'	76.0°	16°28.0'	+11.4'	76.3°	16°42.1'	+12.4'	76.6°	16°55.8'	+13.4'	76.9°	17°09.2'	+14.5'	77.2°	17°22.4'	+15.5'	77.5°	17°35.2'	+16.5'	77.8°	17
18	16°24.0'	+10.0'	75.0°	16°39.4'	+11.1'	75.3°	16°54.5'	+12.1'	75.6°	17°09.2'	+13.1'	75.9°	17°23.7'	+14.2'	76.2°	17°37.9'	+15.2'	76.5°	17°51.7'	+16.2'	76.8°	18
19	16°34.0'	+09.7'	74.0°	16°50.4'	+10.8'	74.3°	17°06.6'	+11.8'	74.6°	17°22.4'	+12.8'	74.9°	17°37.9'	+13.9'	75.2°	17°53.1'	+14.9'	75.5°	18°08.0'	+15.9'	75.8°	19
20	16°43.7'	+09.4'	73.0°	17°01.2'	+10.4'	73.2°	17°18.3'	+11.5'	73.5°	17°35.2'	+12.5'	73.8°	17°51.7'	+13.5'	74.1°	18°08.0'	+14.6'	74.5°	18°23.9'	+15.6'	74.8°	20
21	16°53.2'	+09.1'	71.9°	17°11.6'	+10.1'	72.2°	17°29.8'	+11.2'	72.5°	17°47.7'	+12.2'	72.8°	18°05.3'	+13.2'	73.1°	18°22.5'	+14.2'	73.4°	18°39.5'	+15.3'	73.8°	21
22	17°02.3'	+08.8'	70.9°	17°21.8'	+09.8'</																	

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

78° 282° LHA

Latitude SAME as Declination

78° 282° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	11°38.3'	+14.7'	92.9°	11°35.1'	+15.8'	93.1°	11°31.7'	+16.8'	93.4°	11°28.1'	+17.8'	93.6°	11°24.3'	+18.8'	93.8°	11°20.2'	+19.8'	94.0°	11°16.0'	+20.8'	94.2°	0
1	11°53.0'	+14.5'	92.0°	11°50.9'	+15.5'	92.2°	11°48.5'	+16.6'	92.4°	11°45.9'	+17.6'	92.6°	11°43.1'	+18.6'	92.8°	11°40.1'	+19.6'	93.0°	11°36.8'	+20.6'	93.2°	1
2	12°07.5'	+14.3'	91.0°	12°06.4'	+15.3'	91.2°	12°05.1'	+16.4'	91.4°	12°03.5'	+17.4'	91.6°	12°01.7'	+18.4'	91.8°	11°59.7'	+19.4'	92.0°	11°57.5'	+20.4'	92.2°	2
3	12°21.8'	+14.1'	90.0°	12°21.8'	+15.1'	90.2°	12°21.4'	+16.2'	90.4°	12°20.9'	+17.2'	90.6°	12°20.1'	+18.2'	90.8°	12°19.1'	+19.2'	91.1°	12°17.9'	+20.2'	91.3°	3
4	12°35.9'	+13.9'	89.0°	12°36.9'	+14.9'	89.2°	12°37.6'	+15.9'	89.4°	12°38.1'	+17.0'	89.6°	12°38.3'	+18.0'	89.9°	12°38.4'	+19.0'	90.1°	12°38.2'	+20.0'	90.3°	4
5	12°49.8'	+13.6'	88.0°	12°51.8'	+14.7'	88.2°	12°53.5'	+15.7'	88.4°	12°55.1'	+16.8'	88.7°	12°56.3'	+17.8'	88.9°	12°57.4'	+18.8'	89.1°	12°58.2'	+19.8'	89.3°	5
6	13°03.4'	+13.4'	87.0°	13°06.5'	+14.4'	87.2°	13°09.3'	+15.5'	87.4°	13°11.8'	+16.5'	87.7°	13°14.1'	+17.6'	87.9°	13°16.2'	+18.6'	88.1°	13°18.0'	+19.6'	88.4°	6
7	13°16.8'	+13.2'	86.0°	13°20.9'	+14.2'	86.2°	13°24.7'	+15.3'	86.4°	13°28.3'	+16.3'	86.7°	13°31.7'	+17.3'	86.9°	13°34.8'	+18.4'	87.2°	13°37.6'	+19.4'	87.4°	7
8	13°30.0'	+12.9'	85.0°	13°35.1'	+14.0'	85.2°	13°40.0'	+15.0'	85.5°	13°44.6'	+16.1'	85.7°	13°49.0'	+17.1'	85.9°	13°53.1'	+18.1'	86.2°	13°57.0'	+19.1'	86.4°	8
9	13°42.9'	+12.7'	84.0°	13°49.1'	+13.7'	84.2°	13°55.0'	+14.8'	84.5°	14°00.7'	+15.8'	84.7°	14°06.1'	+16.8'	85.0°	14°11.2'	+17.9'	85.2°	14°16.1'	+18.9'	85.5°	9
10	13°55.6'	+12.4'	83.0°	14°02.8'	+13.5'	83.2°	14°09.8'	+14.5'	83.5°	14°16.5'	+15.6'	83.7°	14°22.9'	+16.6'	84.0°	14°29.1'	+17.6'	84.2°	14°35.0'	+18.7'	84.5°	10
11	14°08.0'	+12.2'	82.0°	14°16.3'	+13.2'	82.2°	14°24.3'	+14.3'	82.5°	14°32.1'	+15.3'	82.7°	14°39.5'	+16.3'	83.0°	14°46.7'	+17.4'	83.2°	14°53.7'	+18.4'	83.5°	11
12	14°20.2'	+11.9'	80.9°	14°29.5'	+13.0'	81.2°	14°38.6'	+14.0'	81.5°	14°47.4'	+15.1'	81.7°	14°55.9'	+16.1'	82.0°	15°04.1'	+17.1'	82.2°	15°12.1'	+18.1'	82.5°	12
13	14°32.2'	+11.7'	79.9°	14°42.5'	+12.7'	80.2°	14°52.6'	+13.7'	80.4°	15°02.4'	+14.8'	80.7°	15°12.0'	+15.8'	81.0°	15°21.2'	+16.9'	81.2°	15°30.2'	+17.9'	81.5°	13
14	14°43.8'	+11.4'	78.9°	14°55.2'	+12.4'	79.2°	15°06.4'	+13.5'	79.4°	15°17.2'	+14.5'	79.7°	15°27.8'	+15.6'	80.0°	15°38.1'	+16.6'	80.3°	15°48.1'	+17.6'	80.5°	14
15	14°55.2'	+11.1'	77.9°	15°07.7'	+12.2'	78.2°	15°19.8'	+13.2'	78.4°	15°31.7'	+14.2'	78.7°	15°43.3'	+15.3'	79.0°	15°54.7'	+16.3'	79.3°	16°05.7'	+17.3'	79.5°	15
16	15°06.4'	+10.9'	76.9°	15°19.8'	+11.9'	77.1°	15°33.0'	+12.9'	77.4°	15°46.0'	+14.0'	77.7°	15°58.6'	+15.0'	78.0°	16°11.0'	+16.0'	78.3°	16°23.1'	+17.1'	78.5°	16
17	15°17.2'	+10.6'	75.9°	15°31.7'	+11.6'	76.1°	15°46.0'	+12.6'	76.4°	16°00.0'	+13.7'	76.7°	16°13.6'	+14.7'	77.0°	16°27.0'	+15.7'	77.2°	16°40.1'	+16.8'	77.5°	17
18	15°27.8'	+10.3'	74.8°	15°43.3'	+11.3'	75.1°	15°58.6'	+12.4'	75.4°	16°13.6'	+13.4'	75.7°	16°28.3'	+14.4'	76.0°	16°42.7'	+15.4'	76.2°	16°56.9'	+16.5'	76.5°	18
19	15°38.1'	+10.0'	73.8°	15°54.7'	+11.0'	74.1°	16°11.0'	+12.1'	74.4°	16°27.0'	+13.1'	74.7°	16°42.7'	+14.1'	74.9°	16°58.2'	+15.1'	75.2°	17°13.3'	+16.2'	75.5°	19
20	15°48.1'	+09.7'	72.8°	16°05.7'	+10.8'	73.1°	16°23.1'	+11.8'	73.3°	16°40.1'	+12.8'	73.6°	16°56.9'	+13.8'	73.9°	17°13.3'	+14.8'	74.2°	17°29.5'	+15.9'	74.5°	20
21	15°57.8'	+09.4'	71.8°	16°16.5'	+10.5'	72.0°	16°34.8'	+11.5'	72.3°	16°52.9'	+12.5'	72.6°	17°10.7'	+13.5'	72.9°	17°28.2'	+14.5'	73.2°	17°45.4'	+15.5'	73.5°	21
22	16°07.3'	+09.1'	70.7°	16°26.9'	+10.2'	71.0°	16°46.3'	+11.2'	71.3°	17°05.4'	+12.2'	71.6°	17°24.2'	+13.2'	71.9°	17°42.7'	+14.2'	72.2°	18°00.9'	+15.2'	72.5°	22
23	16°16.4'	+08.8'	69.7°	16°37.1'	+09.9'	70.0°	16°57.5'	+10.9'	70.3°	17°17.6'	+11.9'	70.6°	17°37.4'	+12.9'	70.9°	17°56.9'	+13.9'	71.2°	18°16.1'	+14.9'	71.5°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

78° 282° LHA

Latitude SAME as Declination

78° 282° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

79° 281° LHA

Latitude SAME as Declination

79° 281° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	10°40.2'	+14.7'	92.7°	10°37.2'	+15.7'	92.9°	10°34.1'	+16.7'	93.1°	10°30.8'	+17.8'	93.3°	10°27.3'	+18.8'	93.4°	10°23.6'	+19.8'	93.6°	10°19.7'	+20.8'	93.8°	0
1	10°54.8'	+14.5'	91.7°	10°53.0'	+15.5'	91.9°	10°50.9'	+16.5'	92.1°	10°48.6'	+17.6'	92.3°	10°46.1'	+18.6'	92.5°	10°43.4'	+19.6'	92.7°	10°40.5'	+20.6'	92.8°	1
2	11°09.3'	+14.3'	90.7°	11°08.5'	+15.3'	90.9°	11°07.4'	+16.4'	91.1°	11°06.1'	+17.4'	91.3°	11°04.7'	+18.4'	91.5°	11°03.0'	+19.4'	91.7°	11°01.1'	+20.4'	91.9°	2
3	11°23.6'	+14.1'	89.7°	11°23.8'	+15.1'	89.9°	11°23.8'	+16.2'	90.1°	11°23.5'	+17.2'	90.3°	11°23.1'	+18.2'	90.5°	11°22.4'	+19.2'	90.7°	11°21.5'	+20.2'	90.9°	3
4	11°37.7'	+13.9'	88.7°	11°38.9'	+14.9'	88.9°	11°39.9'	+16.0'	89.1°	11°40.7'	+17.0'	89.4°	11°41.3'	+18.0'	89.6°	11°41.6'	+19.0'	89.8°	11°41.8'	+20.0'	90.0°	4
5	11°51.6'	+13.7'	87.7°	11°53.9'	+14.7'	88.0°	11°55.9'	+15.8'	88.2°	11°57.7'	+16.8'	88.4°	11°59.3'	+17.8'	88.6°	12°00.7'	+18.8'	88.8°	12°01.8'	+19.8'	89.0°	5
6	12°05.3'	+13.5'	86.7°	12°08.6'	+14.5'	87.0°	12°11.6'	+15.5'	87.2°	12°14.5'	+16.6'	87.4°	12°17.1'	+17.6'	87.6°	12°19.5'	+18.6'	87.8°	12°21.7'	+19.6'	88.0°	6
7	12°18.8'	+13.3'	85.7°	12°23.1'	+14.3'	86.0°	12°27.2'	+15.3'	86.2°	12°31.1'	+16.4'	86.4°	12°34.7'	+17.4'	86.6°	12°38.1'	+18.4'	86.9°	12°41.3'	+19.4'	87.1°	7
8	12°32.0'	+13.0'	84.7°	12°37.4'	+14.1'	85.0°	12°42.5'	+15.1'	85.2°	12°47.4'	+16.1'	85.4°	12°52.1'	+17.2'	85.6°	12°56.5'	+18.2'	85.9°	13°00.7'	+19.2'	86.1°	8
9	12°45.0'	+12.8'	83.7°	12°51.4'	+13.8'	84.0°	12°57.6'	+14.9'	84.2°	13°03.6'	+15.9'	84.4°	13°09.3'	+16.9'	84.7°	13°14.7'	+18.0'	84.9°	13°19.9'	+19.0'	85.1°	9
10	12°57.8'	+12.6'	82.7°	13°05.3'	+13.6'	83.0°	13°12.5'	+14.7'	83.2°	13°19.5'	+15.7'	83.4°	13°26.2'	+16.7'	83.7°	13°32.7'	+17.7'	83.9°	13°38.9'	+18.8'	84.2°	10
11	13°10.4'	+12.3'	81.7°	13°18.9'	+13.4'	82.0°	13°27.2'	+14.4'	82.2°	13°35.2'	+15.4'	82.5°	13°42.9'	+16.5'	82.7°	13°50.4'	+17.5'	82.9°	13°57.7'	+18.5'	83.2°	11
12	13°22.7'	+12.1'	80.7°	13°32.3'	+13.1'	81.0°	13°41.6'	+14.2'	81.2°	13°50.6'	+15.2'	81.5°	13°59.4'	+16.2'	81.7°	14°07.9'	+17.3'	81.9°	14°16.2'	+18.3'	82.2°	12
13	13°34.8'	+11.9'	79.7°	13°45.4'	+12.9'	80.0°	13°55.7'	+13.9'	80.2°	14°05.8'	+15.0'	80.5°	14°15.6'	+16.0'	80.7°	14°25.2'	+17.0'	81.0°	14°34.5'	+18.0'	81.2°	13
14	13°46.7'	+11.6'	78.7°	13°58.3'	+12.6'	79.0°	14°09.7'	+13.7'	79.2°	14°20.8'	+14.7'	79.5°	14°31.6'	+15.7'	79.7°	14°42.2'	+16.8'	80.0°	14°52.5'	+17.8'	80.2°	14
15	13°58.3'	+11.4'	77.7°	14°11.0'	+12.4'	78.0°	14°23.4'	+13.4'	78.2°	14°35.5'	+14.5'	78.5°	14°47.4'	+15.5'	78.7°	14°59.0'	+16.5'	79.0°	15°10.3'	+17.5'	79.2°	15
16	14°09.7'	+11.1'	76.7°	14°23.4'	+12.1'	76.9°	14°36.8'	+13.2'	77.2°	14°49.9'	+14.2'	77.5°	15°02.8'	+15.2'	77.7°	15°15.5'	+16.2'	78.0°	15°27.8'	+17.3'	78.2°	16
17	14°20.8'	+10.8'	75.7°	14°35.5'	+11.9'	75.9°	14°49.9'	+12.9'	76.2°	15°04.1'	+13.9'	76.4°	15°18.1'	+14.9'	76.7°	15°31.7'	+16.0'	77.0°	15°45.1'	+17.0'	77.3°	17
18	14°31.6'	+10.6'	74.7°	14°47.4'	+11.6'	74.9°	15°02.8'	+12.6'	75.2°	15°18.1'	+13.7'	75.4°	15°33.0'	+14.7'	75.7°	15°47.7'	+15.7'	76.0°	16°02.1'	+16.7'	76.3°	18
19	14°42.2'	+10.3'	73.7°	14°59.0'	+11.3'	73.9°	15°15.5'	+12.4'	74.2°	15°31.7'	+13.4'	74.4°	15°47.7'	+14.4'	74.7°	16°03.4'	+15.4'	75.0°	16°18.8'	+16.4'	75.3°	19
20	14°52.5'	+10.0'	72.6°	15°10.3'	+11.1'	72.9°	15°27.8'	+12.1'	73.2°	15°45.1'	+13.1'	73.4°	16°02.1'	+14.1'	73.7°	16°18.8'	+15.1'	74.0°	16°35.2'	+16.1'	74.3°	20
21	15°02.6'	+09.8'	71.6°	15°21.4'	+10.8'	71.9°	15°39.9'	+11.8'	72.1°	15°58.2'	+12.8'	72.4°	16°16.2'	+13.8'	72.7°	16°33.9'	+14.8'	73.0°	16°51.3'	+15.8'	73.2°	21
22																						

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

80° 280° LHA

Latitude SAME as Declination

80° 280° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	9°42.0'+14.6'	92.4°		9°39.4'+15.7'	92.6°		9°36.5'+16.7'	92.8°		9°33.5'+17.7'	93.0°		9°30.4'+18.7'	93.1°		9°27.0'+19.7'	93.3°		9°23.5'+20.7'	93.5°	0	
1	9°56.6'+14.5'	91.5°		9°55.0'+15.5'	91.6°		9°53.2'+16.5'	91.8°		9°51.2'+17.5'	92.0°		9°49.1'+18.6'	92.2°		9°46.7'+19.6'	92.3°		9°44.2'+20.6'	92.5°	1	
2	10°11.1'+14.3'	90.5°		10°10.5'+15.3'	90.7°		10°09.7'+16.3'	90.8°		10°08.8'+17.4'	91.0°		10°07.6'+18.4'	91.2°		10°06.3'+19.4'	91.4°		10°04.8'+20.4'	91.5°	2	
3	10°25.4'+14.1'	89.5°		10°25.8'+15.1'	89.7°		10°26.1'+16.2'	89.9°		10°26.2'+17.2'	90.0°		10°26.0'+18.2'	90.2°		10°25.7'+19.2'	90.4°		10°25.2'+20.2'	90.6°	3	
4	10°39.5'+13.9'	88.5°		10°41.0'+15.0'	88.7°		10°42.3'+16.0'	88.9°		10°43.3'+17.0'	89.1°		10°44.2'+18.0'	89.3°		10°44.9'+19.0'	89.4°		10°45.4'+20.1'	89.6°	4	
5	10°53.4'+13.7'	87.5°		10°55.9'+14.8'	87.7°		10°58.3'+15.8'	87.9°		11°00.4'+16.8'	88.1°		11°02.3'+17.8'	88.3°		11°04.0'+18.9'	88.5°		11°05.4'+19.9'	88.7°	5	
6	11°07.2'+13.5'	86.5°		11°10.7'+14.6'	86.7°		11°14.0'+15.6'	86.9°		11°17.2'+16.6'	87.1°		11°20.1'+17.7'	87.3°		11°22.8'+18.7'	87.5°		11°25.3'+19.7'	87.7°	6	
7	11°20.7'+13.3'	85.5°		11°25.3'+14.4'	85.7°		11°29.7'+15.4'	85.9°		11°33.8'+16.4'	86.1°		11°37.8'+17.5'	86.3°		11°41.5'+18.5'	86.5°		11°45.0'+19.5'	86.7°	7	
8	11°34.0'+13.1'	84.5°		11°39.7'+14.2'	84.7°		11°45.1'+15.2'	84.9°		11°50.2'+16.2'	85.1°		11°55.2'+17.3'	85.4°		12°00.0'+18.3'	85.6°		12°04.5'+19.3'	85.8°	8	
9	11°47.2'+12.9'	83.5°		11°53.8'+14.0'	83.7°		12°00.3'+15.0'	83.9°		12°06.5'+16.0'	84.2°		12°12.5'+17.0'	84.4°		12°18.2'+18.1'	84.6°		12°23.8'+19.1'	84.8°	9	
10	12°00.1'+12.7'	82.5°		12°07.8'+13.7'	82.7°		12°15.3'+14.8'	83.0°		12°22.5'+15.8'	83.2°		12°29.5'+16.8'	83.4°		12°36.3'+17.9'	83.6°		12°42.9'+18.9'	83.8°	10	
11	12°12.8'+12.5'	81.5°		12°21.5'+13.5'	81.7°		12°30.0'+14.6'	82.0°		12°38.3'+15.6'	82.2°		12°46.3'+16.6'	82.4°		12°54.1'+17.6'	82.6°		13°01.7'+18.6'	82.9°	11	
12	12°25.3'+12.3'	80.5°		12°35.1'+13.3'	80.8°		12°44.6'+14.3'	81.0°		12°53.9'+15.4'	81.2°		13°03.0'+16.4'	81.4°		13°11.8'+17.4'	81.7°		13°20.4'+18.4'	81.9°	12	
13	12°37.6'+12.1'	79.5°		12°48.4'+13.1'	79.8°		12°58.9'+14.1'	80.0°		13°09.3'+15.1'	80.2°		13°19.3'+16.2'	80.4°		13°29.2'+17.2'	80.7°		13°38.8'+18.2'	80.9°	13	
14	12°49.6'+11.8'	78.5°		13°01.5'+12.9'	78.8°		13°13.0'+13.9'	79.0°		13°24.4'+14.9'	79.2°		13°35.5'+15.9'	79.4°		13°46.4'+16.9'	79.7°		13°57.0'+18.0'	79.9°	14	
15	13°01.5'+11.6'	77.5°		13°14.3'+12.6'	77.7°		13°26.9'+13.6'	78.0°		13°39.3'+14.7'	78.2°		13°51.4'+15.7'	78.5°		14°03.3'+16.7'	78.7°		14°14.9'+17.7'	78.9°	15	
16	13°13.0'+11.4'	76.5°		13°26.9'+12.4'	76.7°		13°40.6'+13.4'	77.0°		13°54.0'+14.4'	77.2°		14°07.1'+15.4'	77.5°		14°20.0'+16.5'	77.7°		14°32.7'+17.5'	78.0°	16	
17	13°24.4'+11.1'	75.5°		13°39.3'+12.1'	75.7°		13°54.0'+13.2'	76.0°		14°08.4'+14.2'	76.2°		14°22.5'+15.2'	76.5°		14°36.5'+16.2'	76.7°		14°50.1'+17.2'	77.0°	17	
18	13°35.5'+10.9'	74.5°		13°51.4'+11.9'	74.7°		14°07.1'+12.9'	75.0°		14°22.5'+13.9'	75.2°		14°37.7'+14.9'	75.5°		14°52.7'+15.9'	75.7°		15°07.3'+17.0'	76.0°	18	
19	13°46.4'+10.6'	73.5°		14°03.3'+11.6'	73.7°		14°20.0'+12.6'	74.0°		14°36.5'+13.7'	74.2°		14°52.7'+14.7'	74.5°		15°08.6'+15.7'	74.7°		15°24.3'+16.7'	75.0°	19	
20	13°57.0'+10.4'	72.5°		14°14.9'+11.4'	72.7°		14°32.7'+12.4'	73.0°		14°50.1'+13.4'	73.2°		15°07.3'+14.4'	73.5°		15°24.3'+15.4'	73.7°		15°41.0'+16.4'	74.0°	20	
21	14°07.4'+10.1'	71.5°		14°26.3'+11.1'	71.7°		14°45.0'+12.1'	71.9°		15°03.5'+13.1'	72.2°		15°21.7'+14.1'	72.5°		15°39.7'+15.1'	72.7°		15°57.4'+16.1'	73.0°	21	
22	14°17.5'+09.8'	70.4°		14°37.4'+10.9'	70.7°		14°57.2'+11.9'	70.9°		15°16.6'+12.9'	71.2°		15°35.9'+13.9'	71.4°		15°54.8'+14.9'	71.7°		16°13.5'+15.9'	72.0°	22	
23	14°27.3'+09.6'	69.4°		14°48.3'+10.6'	69.7°		15°09.0'+11.6'	69.9°		15°29.5'+12.6'	70.2°		15°49.7'+13.6'	70.4°		16°09.7'+14.6'	70.7°		16°29.4'+15.6'	71.0°	23	
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

80° 280° LHA

Latitude SAME as Declination

80° 280° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

81° 279° LHA

Latitude SAME as Declination

81° 279° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	8°43.8'+14.6'	92.2°		8°41.5'+15.6'	92.3°		8°38.9'+16.7'	92.5°		8°36.2'+17.7'	92.7°		8°33.4'+18.7'	92.8°		8°30.4'+19.7'	93.0°		8°27.2'+20.7'	93.1°	0	
1	8°58.4'+14.5'	91.2°		8°57.1'+15.5'	91.4°		8°55.6'+16.5'	91.5°		8°53.9'+17.5'	91.7°		8°52.0'+18.5'	91.8°		8°50.0'+19.5'	92.0°		8°47.9'+20.5'	92.2°	1	
2	9°12.9'+14.3'	90.2°		9°12.6'+15.3'	90.4°		9°12.1'+16.3'	90.6°		9°11.4'+17.4'	90.7°		9°10.6'+18.4'	90.9°		9°09.6'+19.4'	91.0°		9°08.4'+20.4'	91.2°	2	
3	9°27.2'+14.1'	89.2°		9°27.9'+15.2'	89.4°		9°28.4'+16.2'	89.6°		9°28.8'+17.2'	89.7°		9°29.0'+18.2'	89.9°		9°29.0'+19.2'	90.1°		9°28.8'+20.2'	90.2°	3	
4	9°41.3'+14.0'	88.3°		9°43.0'+15.0'	88.4°		9°44.6'+16.0'	88.6°		9°46.0'+17.0'	88.8°		9°47.2'+18.1'	88.9°		9°48.2'+19.1'	89.1°		9°49.0'+20.1'	89.3°	4	
5	9°55.3'+13.8'	87.3°		9°58.0'+14.8'	87.4°		10°00.6'+15.8'	87.6°		10°03.0'+16.9'	87.8°		10°05.2'+17.9'	88.0°		10°07.2'+18.9'	88.2°		10°09.1'+19.9'	88.3°	5	
6	10°09.1'+13.6'	86.3°		10°12.9'+14.6'	86.5°		10°16.5'+15.7'	86.6°		10°19.9'+16.7'	86.8°		10°23.1'+17.7'	87.0°		10°26.1'+18.7'	87.2°		10°29.0'+19.7'	87.4°	6	
7	10°22.7'+13.4'	85.3°		10°27.5'+14.5'	85.5°		10°32.1'+15.5'	85.7°		10°36.6'+16.5'	85.8°		10°40.8'+17.5'	86.0°		10°44.9'+18.5'	86.2°		10°48.7'+19.6'	86.4°	7	
8	10°36.1'+13.2'	84.3°		10°42.0'+14.3'	84.5°		10°47.6'+15.3'	84.7°		10°53.1'+16.3'	84.9°		10°58.3'+17.3'	85.1°		11°03.4'+18.4'	85.3°		11°08.3'+19.4'	85.5°	8	
9	10°49.3'+13.0'	83.3°		10°56.2'+14.1'	83.5°		11°02.9'+15.1'	83.7°		11°09.4'+16.1'	83.9°		11°15.7'+17.2'	84.1°		11°21.8'+18.2'	84.3°		11°27.6'+19.2'	84.5°	9	
10	11°02.4'+12.9'	82.3°		11°10.3'+13.9'	82.5°		11°18.0'+14.9'	82.7°		11°25.5'+15.9'	82.9°		11°32.8'+17.0'	83.1°		11°39.9'+18.0'	83.3°		11°46.8'+19.0'	83.5°	10	
11	11°15.2'+12.7'	81.3°		11°24.2'+13.7'	81.5°		11°32.9'+14.7'	81.7°		11°41.5'+15.7'	81.9°		11°49.8'+16.8'	82.1°		11°57.9'+17.8'	82.3°		12°05.8'+18.8'	82.6°	11	
12	11°27.9'+12.5'	80.3°		11°37.9'+13.5'	80.5°		11°47.7'+14.5'	80.7°		11°57.2'+15.5'	80.9°		12°06.6'+16.5'	81.1°		12°15.7'+17.6'	81.4°		12°24.6'+18.6'	81.6°	12	
13	11°40.4'+12.2'	79.3°		11°51.4'+13.3'	79.5°		12°02.2'+14.3'	79.7°		12°12.7'+15.3'	80.0°		12°23.1'+16.3'	80.2°		12°33.2'+17.3'	80.4°		12°43.1'+18.4'	80.6°	13	
14	11°52.6'+12.0'	78.3°		12°04.6'+13.1'	78.5°		12°16.5'+14.1'	78.7°		12°28.1'+15.1'	79.0°		12°39.4'+16.1'	79.2°		12°50.6'+17.1'	79.4°		13°01.5'+18.1'	79.6°	14	
15	12°04.6'+11.8'	77.3°		12°17.7'+12.8'	77.5°		12°30.5'+13.9'	77.7°		12°43.2'+14.9'	78.0°		12°55.5'+15.9'	78.2°		13°07.7'+16.9'	78.4°		13°19.6'+17.9'	78.6°	15	
16	12°16.5'+11.6'	76.3°		12°30.5'+12.6'	76.5°		12°44.4'+13.6'	76.8°		12°58.0'+14.7'	77.0°		13°11.4'+15.7'	77.2°		13°24.6'+16.7'	77.4°		13°37.5'+17.7'	77.7°	16	
17	12°28.1'+11.4'	75.3°		12°43.2'+12.4'	75.5°		12°58.0'+13.4'	75.8°		13°12.7'+14.4'	76.0°		13°27.1'+15.4'	76.2°		13°41.3'+16.4'	76.4°		13°55.2'+17.4'	76.7°	17	
18	12°39.4'+11.2'	74.3°		12°55.5'+12.2'	74.5°		13°11.4'+13.2'	74.8°		13°27.1'+14.2'	75.0°		13°42.5'+15.2'	75.2°		13°57.7'+16.2'	75.5°		14°12.7'+17.2'	75.7°	18	
19	12°50.6'+10.9'	73.3°		13°07.7'+11.9'	73.5°		13°24.6'+12.9'	73.8°		13°41.3'+13.9'	74.0°		13°57.7'+14.9'	74.2°		14°13.9'+15.9'	74.5°		14°29.9'+17.0'	74.7°	19	
20	13°01.5'+10.7'	72.3°		13°19.6'+11.7'	72.5°		13°37.5'+12.7'	72.7°		13°55.2'+13.7'	73.0°		14°12.7'+14.7'	73.2°		14°29.9'+15.7'	73.5°		14°46.8'+16.7'	73.7°	20	
21	13°12.2'+10.4'	71.3°		13°31.3'+11.4'	71.5°		13°50.2'+12.4'	71.7°		14°08.9'+13.4'	72.0°		14°27.4'+14.4'	72.2°		14°45.6'+15.4'	72.5°		15°03.5'+16.4'	72.7°	21	
22	13°22.6'+10.2'	70.3°		13°42.8'+11.2'	70.5°		14°02.7'+12.2'	70.7°		14°22.4'+13.2'	71.0°		14°41.8'+14.2'	71.2°		15°01.0'+15.2'	71.5°		15°19.9'+16.2'	71.7°	22	
23	13°32.8'+10.0'	69.3°		13°54.0'+11.0'	69.																	

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

82° 278° LHA

Latitude SAME as Declination

82° 278° LHA

Dec°	14			15			16			17			18			19			20			Dec°			
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°				
0	7°45.7'+14.6'	91.9°	7°43.5'+15.6'	92.1°	7°41.3'+16.6'	92.2°	7°38.9'+17.6'	92.4°	7°36.4'+18.6'	92.5°	7°33.7'+19.6'	92.6°	7°30.9'+20.6'	92.8°	7°30.9'+20.6'	92.8°	7°30.9'+20.6'	92.8°	7°30.9'+20.6'	92.8°	7°30.9'+20.6'	92.8°	0		
1	8°00.2'+14.4'	91.0°	7°59.1'+15.5'	91.1°	7°57.9'+16.5'	91.2°	7°56.5'+17.5'	91.4°	7°55.0'+18.5'	91.5°	7°53.3'+19.5'	91.7°	7°51.5'+20.5'	91.8°	7°51.5'+20.5'	91.8°	7°51.5'+20.5'	91.8°	7°51.5'+20.5'	91.8°	7°51.5'+20.5'	91.8°	1		
2	8°14.7'+14.3'	90.0°	8°14.6'+15.3'	90.1°	8°14.4'+16.3'	90.3°	8°14.0'+17.4'	90.4°	8°13.5'+18.4'	90.6°	8°12.8'+19.4'	90.7°	8°12.0'+20.4'	90.9°	8°12.0'+20.4'	90.9°	8°12.0'+20.4'	90.9°	8°12.0'+20.4'	90.9°	8°12.0'+20.4'	90.9°	2		
3	8°29.0'+14.2'	89.0°	8°29.9'+15.2'	89.2°	8°30.7'+16.2'	89.3°	8°31.4'+17.2'	89.5°	8°31.9'+18.2'	89.6°	8°32.2'+19.2'	89.8°	8°32.4'+20.2'	89.9°	8°32.4'+20.2'	89.9°	8°32.4'+20.2'	89.9°	8°32.4'+20.2'	89.9°	8°32.4'+20.2'	89.9°	3		
4	8°43.1'+14.0'	88.0°	8°45.1'+15.0'	88.2°	8°46.9'+16.1'	88.3°	8°48.6'+17.1'	88.5°	8°50.1'+18.1'	88.6°	8°51.5'+19.1'	88.8°	8°52.6'+20.1'	89.0°	8°52.6'+20.1'	89.0°	8°52.6'+20.1'	89.0°	8°52.6'+20.1'	89.0°	8°52.6'+20.1'	89.0°	4		
5	8°57.1'+13.8'	87.0°	9°00.1'+14.9'	87.2°	9°03.0'+15.9'	87.4°	9°05.7'+16.9'	87.5°	9°08.2'+17.9'	87.7°	9°10.6'+18.9'	87.8°	9°12.7'+19.9'	88.0°	9°12.7'+19.9'	88.0°	9°12.7'+19.9'	88.0°	9°12.7'+19.9'	88.0°	9°12.7'+19.9'	88.0°	5		
6	9°11.0'+13.7'	86.1°	9°15.0'+14.7'	86.2°	9°18.9'+15.7'	86.4°	9°22.6'+16.8'	86.5°	9°26.1'+17.8'	86.7°	9°29.5'+18.8'	86.9°	9°32.7'+19.8'	87.0°	9°32.7'+19.8'	87.0°	9°32.7'+19.8'	87.0°	9°32.7'+19.8'	87.0°	9°32.7'+19.8'	87.0°	6		
7	9°24.7'+13.5'	85.1°	9°29.7'+14.5'	85.2°	9°34.6'+15.6'	85.4°	9°39.4'+16.6'	85.6°	9°43.9'+17.6'	85.7°	9°48.3'+18.6'	85.9°	9°52.5'+19.6'	86.1°	9°52.5'+19.6'	86.1°	9°52.5'+19.6'	86.1°	9°52.5'+19.6'	86.1°	9°52.5'+19.6'	86.1°	7		
8	9°38.2'+13.4'	84.1°	9°44.3'+14.4'	84.2°	9°50.2'+15.4'	84.4°	9°55.9'+16.4'	84.6°	10°01.5'+17.4'	84.8°	10°06.9'+18.4'	84.9°	10°12.1'+19.5'	85.1°	10°12.1'+19.5'	85.1°	10°12.1'+19.5'	85.1°	10°12.1'+19.5'	85.1°	10°12.1'+19.5'	85.1°	8		
9	9°51.5'+13.2'	83.1°	9°58.7'+14.2'	83.3°	10°05.6'+15.2'	83.4°	10°12.4'+16.2'	83.6°	10°18.9'+17.3'	83.8°	10°25.3'+18.3'	84.0°	10°31.5'+19.3'	84.2°	10°31.5'+19.3'	84.2°	10°31.5'+19.3'	84.2°	10°31.5'+19.3'	84.2°	10°31.5'+19.3'	84.2°	9		
10	10°04.7'+13.0'	82.1°	10°12.9'+14.0'	82.3°	10°20.8'+15.0'	82.5°	10°28.6'+16.1'	82.6°	10°36.2'+17.1'	82.8°	10°43.6'+18.1'	83.0°	10°50.8'+19.1'	83.2°	10°50.8'+19.1'	83.2°	10°50.8'+19.1'	83.2°	10°50.8'+19.1'	83.2°	10°50.8'+19.1'	83.2°	10		
11	10°17.7'+12.8'	81.1°	10°26.9'+13.8'	81.3°	10°35.9'+14.9'	81.5°	10°44.7'+15.9'	81.7°	10°53.3'+16.9'	81.8°	11°01.7'+17.9'	82.0°	11°09.9'+18.9'	82.2°	11°09.9'+18.9'	82.2°	11°09.9'+18.9'	82.2°	11°09.9'+18.9'	82.2°	11°09.9'+18.9'	82.2°	11		
12	10°30.5'+12.6'	80.1°	10°40.7'+13.7'	80.3°	10°50.7'+14.7'	80.5°	11°00.6'+15.7'	80.7°	11°10.2'+16.7'	80.9°	11°19.6'+17.7'	81.1°	11°28.8'+18.7'	81.3°	11°28.8'+18.7'	81.3°	11°28.8'+18.7'	81.3°	11°28.8'+18.7'	81.3°	11°28.8'+18.7'	81.3°	12		
13	10°43.2'+12.4'	79.1°	10°54.4'+13.5'	79.3°	11°05.4'+14.5'	79.5°	11°16.3'+15.5'	79.7°	11°26.9'+16.5'	79.9°	11°37.3'+17.5'	80.1°	11°47.5'+18.5'	80.3°	11°47.5'+18.5'	80.3°	11°47.5'+18.5'	80.3°	11°47.5'+18.5'	80.3°	11°47.5'+18.5'	80.3°	13		
14	10°55.6'+12.3'	78.1°	11°07.9'+13.3'	78.3°	11°19.9'+14.3'	78.5°	11°31.8'+15.3'	78.7°	11°43.4'+16.3'	78.9°	11°54.8'+17.3'	79.1°	12°06.1'+18.3'	79.3°	12°06.1'+18.3'	79.3°	12°06.1'+18.3'	79.3°	12°06.1'+18.3'	79.3°	12°06.1'+18.3'	79.3°	14		
15	11°07.9'+12.1'	77.1°	11°21.1'+13.1'	77.3°	11°34.2'+14.1'	77.5°	11°47.1'+15.1'	77.7°	11°59.7'+16.1'	77.9°	12°12.2'+17.1'	78.1°	12°24.4'+18.1'	78.3°	12°24.4'+18.1'	78.3°	12°24.4'+18.1'	78.3°	12°24.4'+18.1'	78.3°	12°24.4'+18.1'	78.3°	15		
16	11°19.9'+11.9'	76.1°	11°34.2'+12.9'	76.3°	11°48.3'+13.9'	76.5°	12°02.2'+14.9'	76.7°	12°15.8'+15.9'	76.9°	12°29.3'+16.9'	77.2°	12°42.5'+17.9'	77.4°	12°42.5'+17.9'	77.4°	12°42.5'+17.9'	77.4°	12°42.5'+17.9'	77.4°	12°42.5'+17.9'	77.4°	16		
17	11°31.8'+11.6'	75.1°	11°47.1'+12.7'	75.3°	12°02.2'+13.7'	75.5°	12°17.0'+14.7'	75.7°	12°31.7'+15.7'	76.0°	12°46.2'+16.7'	76.2°	13°00.4'+17.7'	76.4°	13°00.4'+17.7'	76.4°	13°00.4'+17.7'	76.4°	13°00.4'+17.7'	76.4°	13°00.4'+17.7'	76.4°	17		
18	11°43.4'+11.4'	74.1°	11°59.7'+12.4'	74.3°	12°15.8'+13.4'	74.5°	12°31.7'+14.5'	74.7°	12°47.4'+15.5'	75.0°	13°02.8'+16.5'	75.2°	13°18.1'+17.5'	75.4°	13°18.1'+17.5'	75.4°	13°18.1'+17.5'	75.4°	13°18.1'+17.5'	75.4°	13°18.1'+17.5'	75.4°	18		
19	11°54.8'+11.2'	73.1°	12°12.2'+12.2'	73.3°	12°29.3'+13.2'	73.5°	12°46.2'+14.2'	73.8°	13°02.8'+15.2'	74.0°	13°19.3'+16.2'	74.2°	13°35.5'+17.2'	74.4°	13°35.5'+17.2'	74.4°	13°35.5'+17.2'	74.4°	13°35.5'+17.2'	74.4°	13°35.5'+17.2'	74.4°	19		
20	12°06.1'+11.0'	72.1°	12°24.4'+12.0'	72.3°	12°42.5'+13.0'	72.5°	13°00.4'+14.0'	72.8°	13°18.1'+15.0'	73.0°	13°35.5'+16.0'	73.2°	13°52.7'+17.0'	73.4°	13°52.7'+17.0'	73.4°	13°52.7'+17.0'	73.4°	13°52.7'+17.0'	73.4°	13°52.7'+17.0'	73.4°	20		
21	12°17.1'+10.8'	71.1°	12°36.4'+11.8'	71.3°	12°55.5'+12.8'	71.5°	13°14.4'+13.8'	71.8°	13°33.1'+14.8'	72.0°	13°51.5'+15.7'	72.2°	14°09.7'+16.7'	72.5°	14°09.7'+16.7'	72.5°	14°09.7'+16.7'	72.5°	14°09.7'+16.7'	72.5°	14°09.7'+16.7'	72.5°	21		
22	12°27.9'+10.6'	70.1°	12°48.2'+11.6'	70.3°	13°08.3'+12.5'	70.5°	13°28.2'+13.5'	70.8°	13°47.8'+14.5'	71.0°	14°07.3'+15.5'	71.2°	14°26.4'+16.5'	71.5°	14°26.4'+16.5'	71.5°	14°26.4'+16.5'	71.5°	14°26.4'+16.5'	71.5°	14°26.4'+16.5'	71.5°	22		
23	12°38.4'+10.3'	69.1°	12°59.7'+11.3'	69.3°	13°20.8'+12.3'	69.5°	13°41.7'+13.3'	69.8°	14°02.3'+14.3'	70.0°	14°22.8'+15.3'	70.2°	14°42.9'+16.2'	70.5°	14°42.9'+16.2'	70.5°	14°42.9'+16.2'	70.5°	14°42.9'+16.2'	70.5°	14°42.9'+16.2'	70.5°	23		
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20					20	

82° 278° LHA

Latitude SAME as Declination

82° 278° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

83° 277° LHA

Latitude SAME as Declination

83° 277° LHA

Dec°	14			15			16			17			18			19			20			Dec°	
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°		
0	6°47.5'+14.6'	91.7°	6°45.6'+15.6'	91.8°	6°43.7'+16.6'	91.9°	6°41.6'+17.6'	92.1°	6°39.3'+18.6'	92.2°	6°37.0'+19.6'	92.3°	6°34.6'+20.6'	92.4°	6°34.6'+20.6'	92.4°	6°34.6'+20.6'	92.4°	6°34.6'+20.6'	92.4°	6°34.6'+20.6'	92.4°	0
1	7°02.0'+14.4'	90.7°	7°01.2'+15.5'	90.8°	7°00.2'+16.5'	91.0°	6°59.2'+17.5'	91.1°	6°58.0'+18.5'	91.2°	6°56.6'+19.5'	91.3°	6°55.2'+20.5'	91.5°	6°55.2'+20.5'	91.5°	6°55.2'+20.5'	91.5°	6°55.2'+20.5'	91.5°	6°55.2'+20.5'	91.5°	1
2	7°16.5'+14.3'	89.7°	7°16.7'+15.3'	89.9°	7°16.7'+16.4'	90.0°	7°16.7'+17.4'	90.1°	7°16.5'+18.4'	90.3°	7°16.1'+19.4'	90.4°	7°15.6'+20.4'	90.5°	7°15.6'+20.4'	90.5°	7°15.6'+20.4'	90.5°	7°15.6'+20.4'	90.5°	7°15.6'+20.4'	90.5°	2
3	7°30.8'+14.2'	88.8°	7°32.0'+15.2'	88.9°	7°33.1'+16.2'	89.0°	7°34.0'+17.2'	89.2°	7°34.8'+18.2'	89.3°	7°35.5'+19.3'	89.4°	7°36.0'+20.2'	89.6°	7°36.0'+20.2'	89.6°	7°36.0'+20.2'	89.6°	7°36.0'+20.2'	89.6°	7°36.0'+20.2'	89.6°	3
4	7°45.0'+14.0'	87.8°	7°47.2'+15.1'	87.9°	7°49.3'+16.1'	88.1°	7°51.3'+17.1'	88.2°	7°53.1'+18.1'	88.3°	7°54.7'+19.1'	88.5°	7°56.3'+20.1'	88.6°	7°56.3'+20.1'	88.6°	7°56.3'+20.1'	88.6°	7°56.3'+20.1'	88.6°	7°56.3'+20.1'	88.6°	4
5	7°59.0'+13.9'	86.8°	8°02.3'+14.9'	86.9°	8°05.4'+16.0'	87.1°	8°08.4'+17.0'	87.2°	8°11.2'+18.0'	87.4°	8°13.9'+19.0'	87.5°	8°16.4'+20.0'	87.7°	8°16.4'+20.0'	87.7°	8°16.4'+20.0'	87.7°	8°16.4'+20.0'	87.7°	8°16.4'+20.0'	87.7°	5
6	8°12.9'+13.8'	85.8°	8°17.2'+14.8'	86.0°	8°21.3'+15.8'	86.1°	8°25.3'+16.8'	86.3°	8°29.2'+17.8'	86.4°	8°32.9'+18.8'	86.6°	8°36.4'+19.8'	86.7°	8°36.4'+19.8'	86.7°	8°36.4'+19.8'	86.7°	8°36.4'+19.8'	86.7°	8°36.4'+19.8'	86.7°	6
7	8°26.7'+13.6'	84.8°	8°32.0'+14.6'	85.0°	8°37.2'+15.7'	85.1°	8°42.2'+16.7'	85.3°	8°47.0'+17.7'	85.4°	8°51.7'+18.7'	85.6°	8°56.2'+19.7'	85.8°	8°56.2'+19.7'	85.8°	8°56.2'+19.7'	85.8°	8°56.2'+19.7'	85.8°	8°56.2'+19.7'	85.8°	7
8	8°40.3'+13.5'	83.9°	8°46.6'+14.5'	84.0°	8°52.8'+15.5'	84.2°	8°58.8'+16.5'	84.3°	9°04.7'+17.5'	84.5°	9°10.4'+18.5'	84.6°	9°15.9'+19.5'	84.8°	9°15.9'+19.5'	84.8°	9°15.9'+19.5'	84.8°	9°15.9'+19.5'	84.8°	9°15.9'+19.5'	84.8°	8
9	8°53.7'+13.3'	82.9°	9°01.1'+14.3'	83.0°	9°08.3'+15.4'	83.2°	9°15.4'+16.4'	83.3°	9°22.2'+17.4'	83.5°	9°28.9'+18.4'	83.7°	9°35.5'+19.4'	83.8°	9°35.5'+19.4'	83.8°	9°35.5'+19.4'	83.8°	9°35.5'+19.4'	83.8°	9°35.5'+19.4'	83.8°	9
10	9°07.1'+13.1'	81.9°	9°15.5'+14.2'	82.0°	9°23.7'+15.2'	82.2°	9°31.7'+16.2'	82.4°	9°39.6'+17.2'	82.5°	9°47.3'+18.2'	82.7°	9°54.8'+19.2'	82.9°	9°54.8'+19.2'	82.9°	9°54.8'+19.2'	82.9°	9°54.8'+19.2'	82.9°	9°54.8'+19.2'		

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

84° 276° LHA

Latitude SAME as Declination

84° 276° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°49.3'	+14.5'	91.5°	5°47.7'	+15.6'	91.6°	5°46.0'	+16.6'	91.7°	5°44.2'	+17.6'	91.8°	5°42.3'	+18.6'	91.9°	5°40.3'	+19.6'	92.0°	5°38.2'	+20.6'	92.1°	0
1	6°03.8'	+14.4'	90.5°	6°03.2'	+15.5'	90.6°	6°02.6'	+16.5'	90.7°	6°01.8'	+17.5'	90.8°	6°00.9'	+18.5'	90.9°	6°00.0'	+19.5'	91.0°	5°58.8'	+20.5'	91.1°	1
2	6°18.2'	+14.3'	89.5°	6°18.7'	+15.3'	89.6°	6°19.0'	+16.4'	89.7°	6°19.3'	+17.4'	89.8°	6°19.4'	+18.4'	89.9°	6°19.4'	+19.4'	90.1°	6°19.3'	+20.4'	90.2°	2
3	6°32.6'	+14.2'	88.5°	6°34.1'	+15.2'	88.6°	6°35.4'	+16.3'	88.8°	6°36.7'	+17.3'	88.9°	6°37.8'	+18.3'	89.0°	6°38.8'	+19.3'	89.1°	6°39.6'	+20.3'	89.2°	3
4	6°46.8'	+14.1'	87.5°	6°49.3'	+15.1'	87.7°	6°51.7'	+16.1'	87.8°	6°53.9'	+17.1'	87.9°	6°56.0'	+18.2'	88.0°	6°58.0'	+19.2'	88.2°	7°00.0'	+20.2'	88.3°	4
5	7°00.9'	+14.0'	86.6°	7°04.4'	+15.0'	86.7°	7°07.8'	+16.0'	86.8°	7°11.1'	+17.0'	86.9°	7°14.2'	+18.0'	87.1°	7°17.2'	+19.0'	87.2°	7°20.1'	+20.0'	87.3°	5
6	7°14.8'	+13.8'	85.6°	7°19.4'	+14.9'	85.7°	7°23.8'	+15.9'	85.8°	7°28.1'	+16.9'	86.0°	7°32.2'	+17.9'	86.1°	7°36.2'	+18.9'	86.2°	7°40.1'	+19.9'	86.4°	6
7	7°28.7'	+13.7'	84.6°	7°34.3'	+14.7'	84.7°	7°39.7'	+15.8'	84.9°	7°45.0'	+16.8'	85.0°	7°50.1'	+17.8'	85.1°	7°55.1'	+18.8'	85.3°	8°00.0'	+19.8'	85.4°	7
8	7°42.4'	+13.6'	83.6°	7°49.0'	+14.6'	83.8°	7°55.5'	+15.6'	83.9°	8°01.8'	+16.6'	84.0°	8°07.9'	+17.6'	84.2°	8°13.9'	+18.6'	84.3°	8°19.8'	+19.6'	84.5°	8
9	7°56.0'	+13.4'	82.6°	8°03.6'	+14.5'	82.8°	8°11.1'	+15.5'	82.9°	8°18.4'	+16.5'	83.1°	8°25.6'	+17.5'	83.2°	8°32.6'	+18.5'	83.4°	8°39.4'	+19.5'	83.5°	9
10	8°09.4'	+13.3'	81.7°	8°18.1'	+14.3'	81.8°	8°26.5'	+15.3'	81.9°	8°34.9'	+16.3'	82.1°	8°43.0'	+17.4'	82.2°	8°51.1'	+18.4'	82.4°	8°58.9'	+19.3'	82.6°	10
11	8°22.7'	+13.2'	80.7°	8°32.4'	+14.2'	80.8°	8°41.9'	+15.2'	81.0°	8°51.2'	+16.2'	81.1°	9°00.4'	+17.2'	81.3°	9°09.4'	+18.2'	81.4°	9°18.3'	+19.2'	81.6°	11
12	8°35.9'	+13.0'	79.7°	8°46.6'	+14.0'	79.8°	8°57.1'	+15.0'	80.0°	9°07.4'	+16.0'	80.1°	9°17.6'	+17.0'	80.3°	9°27.6'	+18.0'	80.5°	9°37.5'	+19.0'	80.6°	12
13	8°48.9'	+12.8'	78.7°	9°00.6'	+13.9'	78.9°	9°12.1'	+14.9'	79.0°	9°23.5'	+15.9'	79.2°	9°34.6'	+16.9'	79.3°	9°45.7'	+17.9'	79.5°	9°56.5'	+18.9'	79.7°	13
14	9°01.7'	+12.7'	77.7°	9°14.4'	+13.7'	77.9°	9°27.0'	+14.7'	78.0°	9°39.3'	+15.7'	78.2°	9°51.5'	+16.7'	78.4°	10°03.5'	+17.7'	78.5°	10°15.4'	+18.7'	78.7°	14
15	9°14.4'	+12.5'	76.7°	9°28.1'	+13.5'	76.9°	9°41.7'	+14.5'	77.0°	9°55.0'	+15.5'	77.2°	10°08.2'	+16.5'	77.4°	10°21.2'	+17.5'	77.6°	10°34.1'	+18.5'	77.7°	15
16	9°27.0'	+12.4'	75.7°	9°41.7'	+13.4'	75.9°	9°56.2'	+14.4'	76.1°	10°10.6'	+15.4'	76.2°	10°24.8'	+16.4'	76.4°	10°38.8'	+17.4'	76.6°	10°52.6'	+18.3'	76.8°	16
17	9°39.3'	+12.2'	74.7°	9°55.0'	+13.2'	74.9°	10°10.6'	+14.2'	75.1°	10°25.9'	+15.2'	75.3°	10°41.1'	+16.2'	75.4°	10°56.1'	+17.2'	75.6°	11°10.9'	+18.2'	75.8°	17
18	9°51.5'	+12.0'	73.7°	10°08.2'	+13.0'	73.9°	10°24.8'	+14.0'	74.1°	10°41.1'	+15.0'	74.3°	10°57.3'	+16.0'	74.5°	11°13.3'	+17.0'	74.6°	11°29.1'	+18.0'	74.8°	18
19	10°03.5'	+11.8'	72.7°	10°21.2'	+12.8'	72.9°	10°38.8'	+13.8'	73.1°	10°56.1'	+14.8'	73.3°	11°13.3'	+15.8'	73.5°	11°30.3'	+16.8'	73.7°	11°47.0'	+17.8'	73.9°	19
20	10°15.4'	+11.7'	71.8°	10°34.1'	+12.6'	71.9°	10°52.6'	+13.6'	72.1°	11°10.9'	+14.6'	72.3°	11°29.1'	+15.6'	72.5°	11°47.0'	+16.6'	72.7°	12°04.8'	+17.6'	72.9°	20
21	10°27.0'	+11.5'	70.8°	10°46.7'	+12.5'	70.9°	11°06.2'	+13.4'	71.1°	11°25.5'	+14.4'	71.3°	11°44.7'	+15.4'	71.5°	12°03.6'	+16.4'	71.7°	12°22.4'	+17.3'	71.9°	21
22	10°38.5'	+11.3'	69.8°	10°59.2'	+12.3'	69.9°	11°19.7'	+13.2'	70.1°	11°40.0'	+14.2'	70.3°	12°00.1'	+15.2'	70.5°	12°20.0'	+16.2'	70.7°	12°39.7'	+17.1'	70.9°	22
23	10°49.8'	+11.1'	68.8°	11°11.4'	+12.1'	68.9°	11°32.9'	+13.0'	69.1°	11°54.2'	+14.0'	69.3°	12°15.3'	+15.0'	69.5°	12°36.2'	+15.9'	69.7°	12°56.8'	+16.9'	69.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

84° 276° LHA

Latitude SAME as Declination

84° 276° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

85° 275° LHA

Latitude SAME as Declination

85° 275° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°51.1'	+14.5'	91.2°	4°49.8'	+15.5'	91.3°	4°48.4'	+16.6'	91.4°	4°46.9'	+17.6'	91.5°	4°45.3'	+18.6'	91.5°	4°43.6'	+19.6'	91.6°	4°41.9'	+20.6'	91.7°	0
1	5°05.6'	+14.4'	90.2°	5°05.3'	+15.5'	90.3°	5°04.9'	+16.5'	90.4°	5°04.4'	+17.5'	90.5°	5°03.8'	+18.5'	90.6°	5°03.2'	+19.5'	90.7°	5°02.4'	+20.5'	90.8°	1
2	5°20.0'	+14.3'	89.3°	5°20.8'	+15.4'	89.4°	5°21.4'	+16.4'	89.5°	5°21.9'	+17.4'	89.5°	5°22.3'	+18.4'	89.6°	5°22.7'	+19.4'	89.7°	5°22.9'	+20.4'	89.8°	2
3	5°34.4'	+14.2'	88.3°	5°36.1'	+15.3'	88.4°	5°37.8'	+16.3'	88.5°	5°39.3'	+17.3'	88.6°	5°40.7'	+18.3'	88.7°	5°42.0'	+19.3'	88.8°	5°43.3'	+20.3'	88.9°	3
4	5°48.6'	+14.1'	87.3°	5°51.4'	+15.2'	87.4°	5°54.0'	+16.2'	87.5°	5°56.6'	+17.2'	87.6°	5°59.0'	+18.2'	87.7°	6°01.3'	+19.2'	87.8°	6°03.6'	+20.2'	87.9°	4
5	6°02.8'	+14.0'	86.3°	6°06.6'	+15.1'	86.4°	6°10.2'	+16.1'	86.5°	6°13.8'	+17.1'	86.7°	6°17.2'	+18.1'	86.8°	6°20.5'	+19.1'	86.9°	6°23.8'	+20.1'	87.0°	5
6	6°16.8'	+13.9'	85.4°	6°21.6'	+15.0'	85.5°	6°26.3'	+16.0'	85.6°	6°30.9'	+17.0'	85.7°	6°35.3'	+18.0'	85.8°	6°39.6'	+19.0'	85.9°	6°43.8'	+20.0'	86.0°	6
7	6°30.7'	+13.8'	84.4°	6°36.6'	+14.8'	84.5°	6°42.3'	+15.9'	84.6°	6°47.8'	+16.9'	84.7°	6°53.3'	+17.9'	84.8°	6°58.6'	+18.9'	85.0°	7°03.8'	+19.9'	85.1°	7
8	6°44.6'	+13.7'	83.4°	6°51.4'	+14.7'	83.5°	6°58.1'	+15.7'	83.6°	7°04.7'	+16.7'	83.8°	7°11.2'	+17.7'	83.9°	7°17.5'	+18.7'	84.0°	7°23.7'	+19.7'	84.1°	8
9	6°58.3'	+13.6'	82.4°	7°06.1'	+14.6'	82.5°	7°13.9'	+15.6'	82.7°	7°21.4'	+16.6'	82.8°	7°28.9'	+17.6'	82.9°	7°36.2'	+18.6'	83.1°	7°43.4'	+19.6'	83.2°	9
10	7°11.9'	+13.5'	81.4°	7°20.7'	+14.5'	81.6°	7°29.5'	+15.5'	81.7°	7°38.1'	+16.5'	81.8°	7°46.5'	+17.5'	82.0°	7°54.9'	+18.5'	82.1°	8°03.0'	+19.5'	82.2°	10
11	7°25.3'	+13.3'	80.5°	7°35.2'	+14.3'	80.6°	7°44.9'	+15.3'	80.7°	7°54.6'	+16.4'	80.9°	8°04.0'	+17.4'	81.0°	8°13.3'	+18.4'	81.1°	8°22.5'	+19.3'	81.3°	11
12	7°38.6'	+13.2'	79.5°	7°49.5'	+14.2'	79.6°	8°00.3'	+15.2'	79.7°	8°10.9'	+16.2'	79.9°	8°21.4'	+17.2'	80.0°	8°31.7'	+18.2'	80.2°	8°41.9'	+19.2'	80.3°	12
13	7°51.8'	+13.1'	78.5°	8°03.7'	+14.1'	78.6°	8°15.5'	+15.1'	78.8°	8°27.1'	+16.1'	78.9°	8°38.6'	+17.1'	79.1°	8°49.9'	+18.1'	79.2°	9°01.1'	+19.1'	79.4°	13
14	8°04.9'	+12.9'	77.5°	8°17.8'	+13.9'	77.6°	8°30.6'	+14.9'	77.8°	8°43.2'	+15.9'	77.9°	8°55.7'	+16.9'	78.1°	9°08.0'	+17.9'	78.2°	9°20.1'	+18.9'	78.4°	14
15	8°17.8'	+12.8'	76.5°	8°31.7'	+13.8'	76.7°	8°45.5'	+14.8'	76.8°	8°59.1'	+15.8'	77.0°	9°12.6'	+16.8'	77.1°	9°25.9'	+17.7'	77.3°	9°39.0'	+18.7'	77.4°	15
16	8°30.6'	+12.6'	75.5°	8°45.5'	+13.6'	75.7°	9°00.3'	+14.6'	75.8°	9°14.9'	+15.6'	76.0°	9°29.3'	+16.6'	76.1°	9°43.6'	+17.6'	76.3°	9°57.7'	+18.6'	76.5°	16
17	8°43.2'	+12.5'	74.5°	8°59.1'	+13.5'	74.7°	9°14.9'	+14.5'	74.8°	9°30.5'	+15.4'	75.0°	9°45.9'	+16.4'	75.2°	10°01.2'	+17.4'	75.3°	10°16.3'	+18.4'	75.5°	17
18	8°55.7'	+12.3'	73.5°	9°12.6'	+13.3'	73.7°	9°29.3'	+14.3'	73.9°	9°45.9'	+15.3'	74.0°	10°02.4'	+16.3'	74.2°	10°18.6'	+17.2'	74.4°	10°34.7'	+18.2'	74.5°	18
19	9°08.0'	+12.1'	72.6°	9°25.9'	+13.1'	72.7°	9°43.6'	+14.1'	72.9°	10°01.2'	+15.1'	73.0°	10°18.6'	+16.1'	73.2°	10°35.9'	+17.1'	73.4°	10°52.9'	+18.0'	73.6°	19
20	9°20.1'	+12.0'	71.6°	9°39.0'	+13.0'	71.7°	9°57.7'	+13.9'	71.9°	10°16.3'	+14.9'	72.1°	10°34.7'	+15.9'	72.2°	10°52.9'	+16.9'	72.4°	11°11.0'	+17.8'	72.6°	20
21	9°32.1'	+11.8'	70.6°	9°52.0'	+12.8'	70.7°	10°11.7'	+13.8'	70.9°	10°31.2'	+14.7'	71.1°	10°50.6'	+15.7'	71.3°	11°09.8'	+16.7'	71.4°	11°28.8'	+17.7'	71.6°	21
22	9°43.9'	+11.6'	69.6°	10°04.8'	+12.6'	69.7°	10°25.5'	+13.6'	69.9°	10°46.0'	+14.6'	70.1°	11°06.3'	+15.5'	70.3°	11°26.5'	+16.5'	70.5°	11°46.5'	+17.5'	70.6°	22
23	9°55.5'	+11																				

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

86° 274° LHA

Latitude SAME as Declination

86° 274° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°52.9'+14.5'	91.0°		3°51.8'+15.5'	91.0°		3°50.7'+16.5'	91.1°		3°49.5'+17.5'	91.2°		3°48.2'+18.5'	91.2°		3°46.9'+19.5'	91.3°		3°45.5'+20.5'	91.4°	0	
1	4°07.4'+14.4'	90.0°		4°07.3'+15.5'	90.1°		4°07.2'+16.5'	90.1°		4°07.0'+17.5'	90.2°		4°06.8'+18.5'	90.3°		4°06.4'+19.5'	90.4°		4°06.0'+20.5'	90.4°	1	
2	4°21.8'+14.4'	89.0°		4°22.8'+15.4'	89.1°		4°23.7'+16.4'	89.2°		4°24.5'+17.4'	89.3°		4°25.3'+18.4'	89.3°		4°25.9'+19.4'	89.4°		4°26.5'+20.4'	89.5°	2	
3	4°36.2'+14.3'	88.0°		4°38.2'+15.3'	88.1°		4°40.1'+16.3'	88.2°		4°41.9'+17.3'	88.3°		4°43.7'+18.3'	88.4°		4°45.3'+19.3'	88.5°		4°46.9'+20.3'	88.5°	3	
4	4°50.5'+14.2'	87.1°		4°53.5'+15.2'	87.2°		4°56.4'+16.2'	87.2°		4°59.3'+17.2'	87.3°		5°02.0'+18.2'	87.4°		5°04.7'+19.2'	87.5°		5°07.2'+20.2'	87.6°	4	
5	5°04.7'+14.1'	86.1°		5°08.7'+15.1'	86.2°		5°12.7'+16.1'	86.3°		5°16.5'+17.2'	86.4°		5°20.3'+18.2'	86.5°		5°23.9'+19.2'	86.6°		5°27.5'+20.1'	86.7°	5	
6	5°18.8'+14.0'	85.1°		5°23.8'+15.0'	85.2°		5°28.8'+16.1'	85.3°		5°33.7'+17.1'	85.4°		5°38.4'+18.1'	85.5°		5°43.1'+19.1'	85.6°		5°47.6'+20.1'	85.7°	6	
7	5°32.8'+13.9'	84.1°		5°38.9'+14.9'	84.2°		5°44.9'+16.0'	84.3°		5°50.7'+17.0'	84.4°		5°56.5'+18.0'	84.5°		6°02.1'+19.0'	84.7°		6°07.7'+20.0'	84.8°	7	
8	5°46.8'+13.8'	83.2°		5°53.8'+14.8'	83.3°		6°00.8'+15.9'	83.4°		6°07.7'+16.9'	83.5°		6°14.4'+17.9'	83.6°		6°21.1'+18.9'	83.7°		6°27.6'+19.8'	83.8°	8	
9	6°00.6'+13.7'	82.2°		6°08.7'+14.7'	82.3°		6°16.7'+15.7'	82.4°		6°24.5'+16.8'	82.5°		6°32.3'+17.8'	82.6°		6°39.9'+18.7'	82.7°		6°47.5'+19.7'	82.9°	9	
10	6°14.3'+13.6'	81.2°		6°23.4'+14.6'	81.3°		6°32.4'+15.6'	81.4°		6°41.3'+16.6'	81.5°		6°50.0'+17.6'	81.7°		6°58.7'+18.6'	81.8°		7°07.2'+19.6'	81.9°	10	
11	6°27.9'+13.5'	80.2°		6°38.0'+14.5'	80.3°		6°48.0'+15.5'	80.5°		6°57.9'+16.5'	80.6°		7°07.7'+17.5'	80.7°		7°17.3'+18.5'	80.8°		7°26.8'+19.5'	81.0°	11	
12	6°41.4'+13.4'	79.3°		6°52.6'+14.4'	79.4°		7°03.6'+15.4'	79.5°		7°14.4'+16.4'	79.6°		7°25.2'+17.4'	79.7°		7°35.8'+18.4'	79.9°		7°46.3'+19.4'	80.0°	12	
13	6°54.8'+13.3'	78.3°		7°06.9'+14.3'	78.4°		7°19.0'+15.3'	78.5°		7°30.8'+16.3'	78.6°		7°42.6'+17.3'	78.8°		7°54.2'+18.3'	78.9°		8°05.7'+19.2'	79.0°	13	
14	7°08.1'+13.1'	77.3°		7°21.2'+14.1'	77.4°		7°34.2'+15.1'	77.5°		7°47.1'+16.1'	77.7°		7°59.8'+17.1'	77.8°		8°12.5'+18.1'	77.9°		8°24.9'+19.1'	78.1°	14	
15	7°21.2'+13.0'	76.3°		7°35.4'+14.0'	76.4°		7°49.4'+15.0'	76.6°		8°03.2'+16.0'	76.7°		8°17.0'+17.0'	76.8°		8°30.6'+18.0'	77.0°		8°44.0'+19.0'	77.1°	15	
16	7°34.2'+12.9'	75.3°		7°49.4'+13.9'	75.4°		8°04.4'+14.9'	75.6°		8°19.2'+15.9'	75.7°		8°34.0'+16.8'	75.9°		8°48.5'+17.8'	76.0°		9°03.0'+18.8'	76.2°	16	
17	7°47.1'+12.7'	74.3°		8°03.2'+13.7'	74.5°		8°19.2'+14.7'	74.6°		8°35.1'+15.7'	74.7°		8°50.8'+16.7'	74.9°		9°06.4'+17.7'	75.1°		9°21.8'+18.6'	75.2°	17	
18	7°59.8'+12.6'	73.3°		8°17.0'+13.6'	73.5°		8°34.0'+14.6'	73.6°		8°50.8'+15.6'	73.8°		9°07.5'+16.5'	73.9°		9°24.0'+17.5'	74.1°		9°40.4'+18.5'	74.2°	18	
19	8°12.5'+12.5'	72.4°		8°30.6'+13.4'	72.5°		8°48.5'+14.4'	72.6°		9°06.4'+15.4'	72.8°		9°24.0'+16.4'	73.0°		9°41.5'+17.3'	73.1°		9°58.9'+18.3'	73.3°	19	
20	8°24.9'+12.3'	71.4°		8°44.0'+13.3'	71.5°		9°03.0'+14.3'	71.7°		9°21.8'+15.2'	71.8°		9°40.4'+16.2'	72.0°		9°58.9'+17.2'	72.1°		10°17.2'+18.1'	72.3°	20	
21	8°37.2'+12.2'	70.4°		8°57.3'+13.1'	70.5°		9°17.2'+14.1'	70.7°		9°37.0'+15.1'	70.8°		9°56.6'+16.0'	71.0°		10°16.1'+17.0'	71.2°		10°35.3'+18.0'	71.3°	21	
22	8°49.4'+12.0'	69.4°		9°10.4'+13.0'	69.5°		9°31.3'+13.9'	69.7°		9°52.1'+14.9'	69.9°		10°12.7'+15.9'	70.0°		10°33.1'+16.8'	70.2°		10°53.3'+17.8'	70.4°	22	
23	9°01.4'+11.8'	68.4°		9°23.4'+12.8'	68.5°		9°45.3'+13.8'	68.7°		10°07.0'+14.7'	68.9°		10°28.5'+15.7'	69.0°		10°49.9'+16.6'	69.2°		11°11.1'+17.6'	69.4°	23	
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

86° 274° LHA

Latitude SAME as Declination

86° 274° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

87° 273° LHA

Latitude SAME as Declination

87° 273° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°54.6'+14.5'	90.7°		2°53.9'+15.5'	90.8°		2°53.0'+16.5'	90.8°		2°52.1'+17.5'	90.9°		2°51.2'+18.5'	90.9°		2°50.2'+19.5'	91.0°		2°49.1'+20.5'	91.0°	0	
1	3°09.2'+14.5'	89.8°		3°09.4'+15.5'	89.8°		3°09.6'+16.5'	89.9°		3°09.7'+17.5'	89.9°		3°09.7'+18.5'	90.0°		3°09.7'+19.5'	90.0°		3°09.7'+20.5'	90.1°	1	
2	3°23.6'+14.4'	88.8°		3°24.9'+15.4'	88.8°		3°26.0'+16.4'	88.9°		3°27.2'+17.4'	89.0°		3°28.2'+18.4'	89.0°		3°29.2'+19.4'	89.1°		3°30.1'+20.4'	89.1°	2	
3	3°38.0'+14.3'	87.8°		3°40.3'+15.3'	87.9°		3°42.5'+16.4'	87.9°		3°44.6'+17.4'	88.0°		3°46.6'+18.4'	88.1°		3°48.6'+19.4'	88.1°		3°50.5'+20.4'	88.2°	3	
4	3°52.3'+14.3'	86.8°		3°55.6'+15.3'	86.9°		3°58.8'+16.3'	87.0°		4°01.9'+17.3'	87.0°		4°05.0'+18.3'	87.1°		4°08.0'+19.3'	87.2°		4°10.9'+20.3'	87.3°	4	
5	4°06.6'+14.2'	85.9°		4°10.9'+15.2'	85.9°		4°15.1'+16.2'	86.0°		4°19.2'+17.2'	86.1°		4°23.3'+18.2'	86.2°		4°27.3'+19.2'	86.2°		4°31.2'+20.2'	86.3°	5	
6	4°20.8'+14.1'	84.9°		4°26.1'+15.1'	85.0°		4°31.3'+16.1'	85.0°		4°36.5'+17.1'	85.1°		4°41.5'+18.1'	85.2°		4°46.5'+19.1'	85.3°		4°51.4'+20.1'	85.4°	6	
7	4°34.9'+14.0'	83.9°		4°41.2'+15.1'	84.0°		4°47.5'+16.1'	84.1°		4°53.6'+17.1'	84.2°		4°59.7'+18.1'	84.2°		5°05.6'+19.1'	84.3°		5°11.5'+20.0'	84.4°	7	
8	4°49.0'+14.0'	82.9°		4°56.3'+15.0'	83.0°		5°03.5'+16.0'	83.1°		5°10.7'+17.0'	83.2°		5°17.7'+18.0'	83.3°		5°24.7'+19.0'	83.4°		5°31.6'+20.0'	83.5°	8	
9	5°02.9'+13.9'	82.0°		5°11.3'+14.9'	82.1°		5°19.5'+15.9'	82.1°		5°27.7'+16.9'	82.2°		5°35.7'+17.9'	82.3°		5°43.7'+18.9'	82.4°		5°51.5'+19.9'	82.5°	9	
10	5°16.8'+13.8'	81.0°		5°26.1'+14.8'	81.1°		5°35.4'+15.8'	81.2°		5°44.6'+16.8'	81.3°		5°53.6'+17.8'	81.4°		6°02.6'+18.8'	81.5°		6°11.4'+19.8'	81.6°	10	
11	5°30.6'+13.7'	80.0°		5°40.9'+14.7'	80.1°		5°51.2'+15.7'	80.2°		6°01.3'+16.7'	80.3°		6°11.4'+17.7'	80.4°		6°21.3'+18.7'	80.5°		6°31.2'+19.7'	80.6°	11	
12	5°44.2'+13.6'	79.0°		5°55.6'+14.6'	79.1°		6°06.9'+15.6'	79.2°		6°18.0'+16.6'	79.3°		6°29.1'+17.6'	79.5°		6°40.0'+18.6'	79.6°		6°50.8'+19.5'	79.7°	12	
13	5°57.8'+13.5'	78.1°		6°10.2'+14.5'	78.2°		6°22.5'+15.5'	78.3°		6°34.6'+16.5'	78.4°		6°46.6'+17.5'	78.5°		6°58.6'+18.4'	78.6°		7°10.3'+19.4'	78.7°	13	
14	6°11.3'+13.4'	77.1°		6°24.7'+14.4'	77.2°		6°37.9'+15.4'	77.3°		6°51.1'+16.4'	77.4°		7°04.1'+17.3'	77.5°		7°17.0'+18.3'	77.6°		7°29.8'+19.3'	77.8°	14	
15	6°24.7'+13.3'	76.1°		6°39.0'+14.3'	76.2°		6°53.3'+15.2'	76.3°		7°07.4'+16.2'	76.4°		7°21.4'+17.2'	76.6°		7°35.3'+18.2'	76.7°		7°49.1'+19.2'	76.8°	15	
16	6°37.9'+13.1'	75.1°		6°53.3'+14.1'	75.2°		7°08.5'+15.1'	75.3°		7°23.7'+16.1'	75.5°		7°38.7'+17.1'	75.6°		7°53.5'+18.1'	75.7°		8°08.2'+19.0'	75.9°	16	
17	6°51.1'+13.0'	74.1°		7°07.4'+14.0'	74.2°		7°23.7'+15.0'	74.4°		7°39.8'+16.0'	74.5°		7°55.7'+17.0'	74.6°		8°11.6'+17.9'	74.8°		8°27.3'+18.9'	74.9°	17	
18	7°04.1'+12.9'	73.1°		7°21.4'+13.9'	73.3°		7°38.7'+14.9'	73.4°		7°55.7'+15.8'	73.5°		8°12.7'+16.8'	73.7°		8°29.5'+17.8'	73.8°		8°46.2'+18.8'	73.9°	18	
19	7°17.0'+12.8'	72.2°		7°35.3'+13.7'	72.3°		7°53.5'+14.7'	72.4°		8°11.6'+15.7'	72.5°		8°29.5'+16.7'	72.7°		8°47.3'+17.6'	72.8°		9°04.9'+18.6'	73.0°	19	
20	7°29.8'+12.6'	71.2°		7°49.1'+13.6'	71.3°		8°08.2'+14.6'	71.4°		8°27.3'+15.6'	71.6°		8°46.2'+16.5'	71.7°		9°04.9'+17.5'	71.9°		9°23.5'+18.4'	72.0°	20	
21	7°42.4'+12.5'	70.2°		8°02.7'+13.5'	70.3°		8°22.8'+14.4'	70.5°		8°42.8'+15.4'	70.6°		9°02.7'+16.4'	70.7°		9°22.4'+17.3'	70.9°		9°42.0'+18.3'	71.1°	21	
22	7°54.9'+12.4'	69.2°		8°16.2'+13.3'	69.3°		8°37.3'+14.3'	69.5°		8°58.2'+15.2'	69.6°		9°19.1'+16.2'	69.8°		9°39.7'+17.2'	69.9°		10°00.3'+18.1'	70.1°	22	
23	8°07.3'+12.2'	68.2°		8°29.5'+13.2'	68.3°		8°51.6'+14.1'	68.5°		9°13.5'+15.1'	68.6°		9°35.3'+16.0'	68.8°		9°56.9'+17.0'	69.0°		10°18.4'+17.9'	69.1°	23	
Dec°	Hc°	d'	Z°	Hc°	d'	Z°																

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

88° 272° LHA

Latitude SAME as Declination

88° 272° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°56.4'+14.5'	90.5°		1°55.9'+15.5'	90.5°		1°55.3'+16.5'	90.6°		1°54.8'+17.5'	90.6°		1°54.1'+18.5'	90.6°		1°53.5'+19.5'	90.7°		1°52.8'+20.5'	90.7°		0
1	2°10.9'+14.5'	89.5°		2°11.4'+15.5'	89.6°		2°11.9'+16.5'	89.6°		2°12.3'+17.5'	89.6°		2°12.7'+18.5'	89.7°		2°13.0'+19.5'	89.7°		2°13.3'+20.5'	89.7°		1
2	2°25.4'+14.4'	88.5°		2°26.9'+15.4'	88.6°		2°28.4'+16.5'	88.6°		2°29.8'+17.5'	88.7°		2°31.2'+18.5'	88.7°		2°32.5'+19.5'	88.8°		2°33.8'+20.4'	88.8°		2
3	2°39.8'+14.4'	87.6°		2°42.4'+15.4'	87.6°		2°44.8'+16.4'	87.7°		2°47.2'+17.4'	87.7°		2°49.6'+18.4'	87.8°		2°51.9'+19.4'	87.8°		2°54.2'+20.4'	87.9°		3
4	2°54.2'+14.3'	86.6°		2°57.8'+15.3'	86.6°		3°01.2'+16.4'	86.7°		3°04.7'+17.4'	86.8°		3°08.0'+18.4'	86.8°		3°11.3'+19.4'	86.9°		3°14.6'+20.3'	86.9°		4
5	3°08.5'+14.3'	85.6°		3°13.1'+15.3'	85.7°		3°17.6'+16.3'	85.7°		3°22.0'+17.3'	85.8°		3°26.4'+18.3'	85.9°		3°30.7'+19.3'	85.9°		3°34.9'+20.3'	86.0°		5
6	3°22.8'+14.2'	84.7°		3°28.4'+15.2'	84.7°		3°33.9'+16.2'	84.8°		3°39.3'+17.2'	84.8°		3°44.7'+18.2'	84.9°		3°50.0'+19.2'	85.0°		3°55.2'+20.2'	85.0°		6
7	3°37.0'+14.2'	83.7°		3°43.6'+15.2'	83.7°		3°50.1'+16.2'	83.8°		3°56.6'+17.2'	83.9°		4°02.9'+18.2'	83.9°		4°09.2'+19.2'	84.0°		4°15.4'+20.1'	84.1°		7
8	3°51.2'+14.1'	82.7°		3°58.8'+15.1'	82.8°		4°06.3'+16.1'	82.8°		4°13.7'+17.1'	82.9°		4°21.1'+18.1'	83.0°		4°28.4'+19.1'	83.1°		4°35.6'+20.1'	83.1°		8
9	4°05.3'+14.0'	81.7°		4°13.9'+15.0'	81.8°		4°22.4'+16.0'	81.9°		4°30.8'+17.0'	82.0°		4°39.2'+18.0'	82.0°		4°47.5'+19.0'	82.1°		4°55.6'+20.0'	82.2°		9
10	4°19.3'+13.9'	80.8°		4°28.9'+14.9'	80.8°		4°38.4'+15.9'	80.9°		4°47.9'+16.9'	81.0°		4°57.2'+17.9'	81.1°		5°06.5'+18.9'	81.2°		5°15.6'+19.9'	81.3°		10
11	4°33.3'+13.9'	79.8°		4°43.9'+14.9'	79.9°		4°54.4'+15.9'	79.9°		5°04.8'+16.9'	80.0°		5°15.1'+17.9'	80.1°		5°25.4'+18.8'	80.2°		5°35.6'+19.8'	80.3°		11
12	4°47.1'+13.8'	78.8°		4°58.7'+14.8'	78.9°		5°10.2'+15.8'	79.0°		5°21.7'+16.8'	79.1°		5°33.0'+17.8'	79.2°		5°44.2'+18.7'	79.3°		5°55.4'+19.7'	79.4°		12
13	5°00.9'+13.7'	77.8°		5°13.5'+14.7'	77.9°		5°26.0'+15.7'	78.0°		5°38.4'+16.7'	78.1°		5°50.8'+17.7'	78.2°		6°03.0'+18.6'	78.3°		6°15.1'+19.6'	78.4°		13
14	5°14.6'+13.6'	76.9°		5°28.2'+14.6'	76.9°		5°41.7'+15.6'	77.0°		5°55.1'+16.6'	77.1°		6°08.4'+17.6'	77.2°		6°21.6'+18.5'	77.3°		6°34.7'+19.5'	77.5°		14
15	5°28.2'+13.5'	75.9°		5°42.8'+14.5'	76.0°		5°57.3'+15.5'	76.1°		6°11.7'+16.5'	76.2°		6°26.0'+17.4'	76.3°		6°40.2'+18.4'	76.4°		6°54.2'+19.4'	76.5°		15
16	5°41.7'+13.4'	74.9°		5°57.3'+14.4'	75.0°		6°12.8'+15.4'	75.1°		6°28.2'+16.4'	75.2°		6°43.4'+17.3'	75.3°		6°58.6'+18.3'	75.4°		7°13.6'+19.3'	75.6°		16
17	5°55.1'+13.3'	73.9°		6°11.7'+14.3'	74.0°		6°28.2'+15.3'	74.1°		6°44.5'+16.2'	74.2°		7°00.8'+17.2'	74.3°		7°16.9'+18.2'	74.5°		7°32.9'+19.2'	74.6°		17
18	6°08.4'+13.2'	72.9°		6°26.0'+14.2'	73.0°		6°43.4'+15.2'	73.1°		7°00.8'+16.1'	73.3°		7°18.0'+17.1'	73.4°		7°35.1'+18.1'	73.5°		7°52.0'+19.0'	73.6°		18
19	6°21.6'+13.1'	72.0°		6°40.2'+14.1'	72.1°		6°58.6'+15.0'	72.2°		7°16.9'+16.0'	72.3°		7°35.1'+17.0'	72.4°		7°53.1'+17.9'	72.5°		8°11.1'+18.9'	72.7°		19
20	6°34.7'+13.0'	71.0°		6°54.2'+13.9'	71.1°		7°13.6'+14.9'	71.2°		7°32.9'+15.9'	71.3°		7°52.0'+16.8'	71.4°		8°11.1'+17.8'	71.6°		8°29.9'+18.7'	71.7°		20
21	6°47.7'+12.9'	70.0°		7°08.2'+13.8'	70.1°		7°28.5'+14.8'	70.2°		7°48.8'+15.7'	70.3°		8°08.9'+16.7'	70.5°		8°28.9'+17.6'	70.6°		8°48.7'+18.6'	70.8°		21
22	7°00.5'+12.7'	69.0°		7°22.0'+13.7'	69.1°		7°43.3'+14.6'	69.2°		8°04.5'+15.6'	69.4°		8°25.6'+16.6'	69.5°		8°46.5'+17.5'	69.7°		9°07.3'+18.4'	69.8°		22
23	7°13.3'+12.6'	68.0°		7°35.7'+13.6'	68.1°		7°57.9'+14.5'	68.3°		8°20.1'+15.5'	68.4°		8°42.1'+16.4'	68.5°		9°04.0'+17.3'	68.7°		9°25.7'+18.3'	68.8°		23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

88° 272° LHA

Latitude SAME as Declination

88° 272° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

89° 271° LHA

Latitude SAME as Declination

89° 271° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°58.2'+14.5'	90.2°		0°58.0'+15.5'	90.3°		0°57.7'+16.5'	90.3°		0°57.4'+17.5'	90.3°		0°57.1'+18.5'	90.3°		0°56.7'+19.5'	90.3°		0°56.4'+20.5'	90.3°		0
1	1°12.7'+14.5'	89.3°		1°13.5'+15.5'	89.3°		1°14.2'+16.5'	89.3°		1°14.9'+17.5'	89.3°		1°15.6'+18.5'	89.4°		1°16.3'+19.5'	89.4°		1°16.9'+20.5'	89.4°		1
2	1°27.2'+14.5'	88.3°		1°29.0'+15.5'	88.3°		1°30.7'+16.5'	88.4°		1°32.4'+17.5'	88.4°		1°34.1'+18.5'	88.4°		1°35.8'+19.5'	88.4°		1°37.4'+20.5'	88.5°		2
3	1°41.7'+14.4'	87.3°		1°44.5'+15.4'	87.4°		1°47.2'+16.5'	87.4°		1°49.9'+17.5'	87.4°		1°52.6'+18.5'	87.5°		1°55.2'+19.4'	87.5°		1°57.9'+20.4'	87.5°		3
4	1°56.1'+14.4'	86.4°		2°00.0'+15.4'	86.4°		2°03.7'+16.4'	86.4°		2°07.4'+17.4'	86.5°		2°11.1'+18.4'	86.5°		2°14.7'+19.4'	86.5°		2°18.3'+20.4'	86.6°		4
5	2°10.5'+14.4'	85.4°		2°15.3'+15.4'	85.4°		2°20.1'+16.4'	85.5°		2°24.8'+17.4'	85.5°		2°29.5'+18.4'	85.5°		2°34.1'+19.4'	85.6°		2°38.7'+20.4'	85.6°		5
6	2°24.9'+14.3'	84.4°		2°30.7'+15.3'	84.5°		2°36.5'+16.3'	84.5°		2°42.2'+17.3'	84.5°		2°47.9'+18.3'	84.6°		2°53.5'+19.3'	84.6°		2°59.1'+20.3'	84.7°		6
7	2°39.2'+14.3'	83.4°		2°46.0'+15.3'	83.5°		2°52.8'+16.3'	83.5°		2°59.5'+17.3'	83.6°		3°06.2'+18.3'	83.6°		3°12.8'+19.3'	83.7°		3°19.4'+20.3'	83.8°		7
8	2°53.5'+14.2'	82.5°		3°01.3'+15.2'	82.5°		3°09.1'+16.2'	82.6°		3°16.8'+17.2'	82.6°		3°24.5'+18.2'	82.7°		3°32.1'+19.2'	82.7°		3°39.6'+20.2'	82.8°		8
9	3°07.7'+14.2'	81.5°		3°16.5'+15.2'	81.6°		3°25.3'+16.2'	81.6°		3°34.0'+17.2'	81.7°		3°42.7'+18.2'	81.7°		3°51.3'+19.1'	81.8°		3°59.8'+20.1'	81.9°		9
10	3°21.9'+14.1'	80.5°		3°31.7'+15.1'	80.6°		3°41.5'+16.1'	80.6°		3°51.2'+17.1'	80.7°		4°00.9'+18.1'	80.8°		4°10.4'+19.1'	80.9°		4°19.9'+20.1'	80.9°		10
11	3°36.0'+14.1'	79.6°		3°46.8'+15.1'	79.6°		3°57.6'+16.0'	79.7°		4°08.3'+17.0'	79.8°		4°19.0'+18.0'	79.8°		4°29.5'+19.0'	79.9°		4°40.0'+20.0'	80.0°		11
12	3°50.0'+14.0'	78.6°		4°01.9'+15.0'	78.6°		4°13.7'+16.0'	78.7°		4°25.4'+17.0'	78.8°		4°37.0'+17.9'	78.9°		4°48.5'+18.9'	78.9°		5°00.0'+19.9'	79.0°		12
13	4°04.0'+13.9'	77.6°		4°16.9'+14.9'	77.7°		4°29.6'+15.9'	77.7°		4°42.3'+16.9'	77.8°		4°54.9'+17.9'	77.9°		5°07.5'+18.8'	78.0°		5°19.9'+19.8'	78.1°		13
14	4°17.9'+13.8'	76.6°		4°31.8'+14.8'	76.7°		4°45.5'+15.8'	76.8°		4°59.2'+16.8'	76.9°		5°12.8'+17.8'	77.0°		5°26.3'+18.8'	77.0°		5°39.7'+19.7'	77.1°		14
15	4°31.8'+13.8'	75.7°		4°46.6'+14.7'	75.7°		5°01.3'+15.7'	75.8°		5°16.0'+16.7'	75.9°		5°30.6'+17.7'	76.0°		5°45.1'+18.7'	76.1°		5°59.4'+19.6'	76.2°		15
16	4°45.5'+13.7'	74.7°		5°01.3'+14.7'	74.8°		5°17.1'+15.6'	74.8°		5°32.7'+16.6'	74.9°		5°48.3'+17.6'	75.0°		6°03.7'+18.6'	75.1°		6°19.1'+19.5'	75.2°		16
17	4°59.2'+13.6'	73.7°		5°16.0'+14.6'	73.8°		5°32.7'+15.5'	73.9°		5°49.3'+16.5'	74.0°		6°05.9'+17.5'	74.1°		6°22.3'+18.5'	74.2°		6°38.6'+19.4'	74.3°		17
18	5°12.8'+13.5'	72.7°		5°30.6'+14.5'	72.8°		5°48.3'+15.4'	72.9°		6°05.9'+16.4'	73.0°		6°23.3'+17.4'	73.1°		6°40.7'+18.3'	73.2°		6°58.0'+19.3'	73.3°		18
19	5°26.3'+13.4'	71.7°		5°45.1'+14.4'	71.8°		6°03.7'+15.3'	71.9°		6°22.3'+16.3'	72.0°		6°40.7'+17.3'	72.1°		6°59.1'+18.2'	72.3°		7°17.3'+19.2'	72.4°		19
20	5°39.7'+13.3'	70.8°		5°59.4'+14.3'	70.9°		6°19.1'+15.2'	71.0°		6°38.6'+16.2'	71.1°		6°58.0'+17.1'	71.2°		7°17.3'+18.1'	71.3°		7°36.5'+19.1'	71.4°		20
21	5°53.0'+13.2'	69.8°		6°13.7'+14.2'	69.9°		6°34.3'+15.1'	70.0°		6°54.8'+16.1'	70.1°		7°15.1'+17.0'	70.2°		7°35.4'+18.0'	70.3°		7°55.5'+18.9'	70.5°		21
22	6°06.2'+13.1'	68.8°		6°27.9'+14.1'	68.9°		6°49.4'+15.0'	69.0°		7°10.8'+16.0'	69.1°		7°32.2'+16.9'	69.2°		7°53.4'+17.8'	69.4°		8°14.4'+18.8'	69.5°		22
23	6°19.3'+13.0'	67.8°		6°41.9'+13.9'	67.9°		7°04.4'+14.9'	68.0°		7°26.8'+15.8'	68.2°		7°49.1'+16.8'	68.3°								

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

90° 270° LHA

Latitude CONTRARY or SAME as Declination

90° 270° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°00.0'+14.5'	90.0°	0°00.0'+15.5'	90.0°	0°00.0'+16.5'	90.0°	0°00.0'+17.5'	90.0°	0°00.0'+18.5'	90.0°	0°00.0'+19.5'	90.0°	0°00.0'+20.5'	90.0°	0							
1	0°14.5'+14.5'	89.0°	0°15.5'+15.5'	89.0°	0°16.5'+16.5'	89.0°	0°17.5'+17.5'	89.0°	0°18.5'+18.5'	89.0°	0°19.5'+19.5'	89.1°	0°20.5'+20.5'	89.1°	1							
2	0°29.0'+14.5'	88.1°	0°31.1'+15.5'	88.1°	0°33.1'+16.5'	88.1°	0°35.1'+17.5'	88.1°	0°37.1'+18.5'	88.1°	0°39.1'+19.5'	88.1°	0°41.0'+20.5'	88.1°	2							
3	0°43.5'+14.5'	87.1°	0°46.6'+15.5'	87.1°	0°49.6'+16.5'	87.1°	0°52.6'+17.5'	87.1°	0°55.6'+18.5'	87.1°	0°58.6'+19.5'	87.2°	1°01.5'+20.5'	87.2°	3							
4	0°58.0'+14.5'	86.1°	1°02.1'+15.5'	86.1°	1°06.1'+16.5'	86.2°	1°10.1'+17.5'	86.2°	1°14.1'+18.5'	86.2°	1°18.1'+19.5'	86.2°	1°22.0'+20.5'	86.2°	4							
5	1°12.5'+14.5'	85.1°	1°17.6'+15.5'	85.2°	1°22.6'+16.5'	85.2°	1°27.6'+17.5'	85.2°	1°32.6'+18.5'	85.2°	1°37.6'+19.5'	85.3°	1°42.5'+20.4'	85.3°	5							
6	1°26.9'+14.4'	84.2°	1°33.0'+15.4'	84.2°	1°39.1'+16.4'	84.2°	1°45.1'+17.4'	84.3°	1°51.1'+18.4'	84.3°	1°57.0'+19.4'	84.3°	2°02.9'+20.4'	84.4°	6							
7	1°41.4'+14.4'	83.2°	1°48.5'+15.4'	83.2°	1°55.5'+16.4'	83.3°	2°02.5'+17.4'	83.3°	2°09.5'+18.4'	83.3°	2°16.4'+19.4'	83.4°	2°23.3'+20.4'	83.4°	7							
8	1°55.8'+14.4'	82.2°	2°03.9'+15.4'	82.3°	2°11.9'+16.4'	82.3°	2°19.9'+17.4'	82.3°	2°27.9'+18.4'	82.4°	2°35.8'+19.3'	82.4°	2°43.7'+20.3'	82.5°	8							
9	2°10.1'+14.3'	81.3°	2°19.2'+15.3'	81.3°	2°28.3'+16.3'	81.3°	2°37.3'+17.3'	81.4°	2°46.2'+18.3'	81.4°	2°55.2'+19.3'	81.5°	3°04.0'+20.3'	81.5°	9							
10	2°24.5'+14.3'	80.3°	2°34.6'+15.3'	80.3°	2°44.6'+16.3'	80.4°	2°54.6'+17.3'	80.4°	3°04.6'+18.3'	80.5°	3°14.5'+19.2'	80.5°	3°24.3'+20.2'	80.6°	10							
11	2°38.7'+14.2'	79.3°	2°49.8'+15.2'	79.4°	3°00.9'+16.2'	79.4°	3°11.9'+17.2'	79.5°	3°22.8'+18.2'	79.5°	3°33.7'+19.2'	79.6°	3°44.5'+20.2'	79.6°	11							
12	2°53.0'+14.2'	78.3°	3°05.1'+15.2'	78.4°	3°17.1'+16.2'	78.5°	3°29.1'+17.2'	78.5°	3°41.0'+18.1'	78.6°	3°52.9'+19.1'	78.6°	4°04.7'+20.1'	78.7°	12							
13	3°07.2'+14.1'	77.4°	3°20.3'+15.1'	77.4°	3°33.3'+16.1'	77.5°	3°46.3'+17.1'	77.5°	3°59.2'+18.1'	77.6°	4°12.0'+19.0'	77.7°	4°24.8'+20.0'	77.8°	13							
14	3°21.3'+14.1'	76.4°	3°35.4'+15.1'	76.5°	3°49.4'+16.0'	76.5°	4°03.4'+17.0'	76.6°	4°17.2'+18.0'	76.7°	4°31.0'+19.0'	76.7°	4°44.8'+19.9'	76.8°	14							
15	3°35.4'+14.0'	75.4°	3°50.5'+15.0'	75.5°	4°05.5'+16.0'	75.6°	4°20.4'+17.0'	75.6°	4°35.2'+17.9'	75.7°	4°50.0'+18.9'	75.8°	5°04.7'+19.9'	75.9°	15							
16	3°49.4'+14.0'	74.5°	4°05.5'+14.9'	74.5°	4°21.4'+15.9'	74.6°	4°37.3'+16.9'	74.7°	4°53.2'+17.8'	74.7°	5°08.9'+18.8'	74.8°	5°24.6'+19.8'	74.9°	16							
17	4°03.4'+13.9'	73.5°	4°20.4'+14.9'	73.5°	4°37.3'+15.8'	73.6°	4°54.2'+16.8'	73.7°	5°11.0'+17.8'	73.8°	5°27.7'+18.7'	73.9°	5°44.3'+19.7'	74.0°	17							
18	4°17.2'+13.8'	72.5°	4°35.2'+14.8'	72.6°	4°53.2'+15.7'	72.7°	5°11.0'+16.7'	72.7°	5°28.8'+17.7'	72.8°	5°46.4'+18.6'	72.9°	6°04.0'+19.6'	73.0°	18							
19	4°31.0'+13.7'	71.5°	4°50.0'+14.7'	71.6°	5°08.9'+15.7'	71.7°	5°27.7'+16.6'	71.8°	5°46.4'+17.6'	71.9°	6°05.1'+18.5'	72.0°	6°23.6'+19.5'	72.1°	19							
20	4°44.8'+13.6'	70.5°	5°04.7'+14.6'	70.6°	5°24.6'+15.6'	70.7°	5°44.3'+16.5'	70.8°	6°04.0'+17.5'	70.9°	6°23.6'+18.4'	71.0°	6°43.1'+19.4'	71.1°	20							
21	4°58.4'+13.6'	69.6°	5°19.3'+14.5'	69.7°	5°40.1'+15.5'	69.7°	6°00.9'+16.4'	69.8°	6°21.5'+17.4'	69.9°	6°42.0'+18.3'	70.1°	7°02.4'+19.2'	70.2°	21							
22	5°12.0'+13.5'	68.6°	5°33.8'+14.4'	68.7°	5°55.6'+15.4'	68.8°	6°17.3'+16.3'	68.9°	6°38.8'+17.3'	69.0°	7°00.3'+18.2'	69.1°	7°21.7'+19.1'	69.2°	22							
23	5°25.4'+13.4'	67.6°	5°48.3'+14.3'	67.7°	6°11.0'+15.3'	67.8°	6°33.6'+16.2'	67.9°	6°56.1'+17.1'	68.0°	7°18.5'+18.1'	68.1°	7°40.8'+19.0'	68.3°	23							
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

90° 270° LHA

Latitude CONTRARY or SAME as Declination

90° 270° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

89° 271° LHA

Latitude CONTRARY to Declination

89° 271° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	0°58.2'-14.5'	90.2°	0°58.0'-15.5'	90.3°	0°57.7'-16.5'	90.3°	0°57.4'-17.6'	90.3°	0°57.1'-18.6'	90.3°	0°56.7'-19.5'	90.3°	0°56.4'-20.5'	90.3°	0							
1	0°43.7'-14.5'	91.2°	0°42.4'-15.6'	91.2°	0°41.1'-16.6'	91.2°	0°39.8'-17.6'	91.2°	0°38.5'-18.6'	91.3°	0°37.2'-19.6'	91.3°	0°35.9'-20.5'	91.3°	1							
2	0°29.2'-14.5'	92.2°	0°26.9'-15.6'	92.2°	0°24.6'-16.6'	92.2°	0°22.3'-17.6'	92.2°	0°20.0'-18.6'	92.2°	<u>0°17.6'-19.6'</u> 92.2°	<u>0°15.3'-20.5'</u> 92.2°	0°14.0'-21.5'	92.2°	2							
3	0°14.6'-14.6'	93.2°	<u>0°11.3'-15.6'</u> 93.2°	<u>0°08.0'-16.6'</u> 93.2°	<u>0°04.7'-17.6'</u> 93.2°	<u>0°01.4'-18.6'</u> 93.2°	0°01.9'+19.6'	86.8°	0°05.2'+20.5'	86.8°	0											
4	<u>0°00.1'-14.6'</u> 94.1°	0°04.3'+15.6'	85.9°	0°08.6'+16.6'	85.9°	0°12.9'+17.6'	85.9°	0°17.2'+18.6'	85.9°	0°21.5'+19.6'	85.9°	0°25.8'+20.5'	85.9°	4								
5	0°14.5'+14.5'	84.9°	0°19.8'+15.6'	84.9°	0°25.1'+16.6'	84.9°	0°30.4'+17.6'	84.9°	0°35.7'+18.6'	84.9°	0°41.0'+19.5'	84.9°	0°46.3'+20.5'	85.0°	5							
6	0°29.0'+14.5'	83.9°	0°35.4'+15.5'	83.9°	0°41.7'+16.5'	84.0°	0°48.0'+17.5'	84.0°	0°54.3'+18.5'	84.0°	1°00.6'+19.5'	84.0°	1°06.8'+20.5'	84.0°	6							
7	0°43.6'+14.5'	83.0°	0°50.9'+15.5'	83.0°	0°58.2'+16.5'	83.0°	1°05.5'+17.5'	83.0°	1°12.8'+18.5'	83.0°	1°20.1'+19.5'	83.1°	1°27.3'+20.5'	83.1°	7							
8	0°58.1'+14.5'	82.0°	1°06.4'+15.5'	82.0°	1°14.8'+16.5'	82.0°	1°23.1'+17.5'	82.1°	1°31.4'+18.5'	82.1°	1°39.6'+19.5'	82.1°	1°47.8'+20.5'	82.1°	8							
9	1°12.6'+14.5'	81.0°	1°22.0'+15.5'	81.0°	1°31.3'+16.5'	81.1°	1°40.6'+17.5'	81.1°	1°49.8'+18.5'	81.1°	1°59.1'+19.4'	81.2°	2°08.3'+20.4'	81.2°	9							
10	1°27.1'+14.5'	80.1°	1°37.4'+15.5'	80.1°	1°47.8'+16.5'	80.1°	1°58.1'+17.4'	80.1°	2°08.3'+18.4'	80.2°	2°18.5'+19.4'	80.2°	2°28.7'+20.4'	80.3°	10							
11	1°41.6'+14.4'	79.1°	1°52.9'+15.4'	79.1°	2°04.2'+16.4'	79.1°	2°15.5'+17.4'	79.2°	2°26.7'+18.4'	79.2°	2°37.9'+19.4'	79.3°	2°49.1'+20.3'	79.3°	11							
12	1°56.0'+14.4'	78.1°	2°08.3'+15.4'	78.1°	2°20.6'+16.4'	78.2°	2°32.9'+17.4'	78.2°	2°45.1'+18.3'	78.3°	2°57.3'+19.3'	78.3°	3°09.4'+20.3'	78.4°	12							
13	2°10.4'+14.4'	77.1°	2°23.7'+15.4'	77.2°	2°37.0'+16.3'	77.2°	2°50.3'+17.3'	77.3°	3°03.5'+18.3'	77.3°	3°16.6'+19.3'	77.4°	3°29.7'+20.2'	77.4°	13							
14	2°24.8'+14.3'	76.2°	2°39.1'+15.3'	76.2°	2°53.4'+16.3'	76.3°	3°07.6'+17.3'	76.3°	3°21.7'+18.2'	76.4°	3°35.9'+19.2'	76.4°	3°49.9'+20.2'	76.5°	14							
15	2°39.1'+14.3'	75.2°	2°54.4'+15.3'	75.2°	3°09.6'+16.2'	75.3°	3°24.8'+17.2'	75.4°	3°40.0'+18.2'	75.4°	3°55.1'+19.1'	75.5°	4°10.1'+20.1'	75.5°	15							
16	2°53.4'+14.2'	74.2°	3°09.6'+15.2'	74.3°	3°25.9'+16.2'	74.3°	3°42.0'+17.1'	74.4°	3°58.2'+18.1'	74.5°	4°14.2'+19.1'	74.5°	4°30.2'+20.0'	74.6°	16							
17	3°07.6'+14.2'	73.3°	3°24.8'+15.1'	73.3°	3°42.0'+16.1'	73.4°	3°59.2'+17.1'	73.4°	4°16.3'+18.0'	73.5°	4°33.3'+19.0'	73.6°	4°50.2'+19.9'	73.7°	17							
18	3°21.7'+14.1'	72.3°	3°40.0'+15.1'	72.3°	3°58.2'+16.0'	72.4°	4°16.3'+17.0'	72.5°	4°34.3'+18.0'	72.5°	4°52.3'+18.9'	72.6°	5°10.1'+19.9'	72.7°	18							
19	3°35.9'+14.1'	71.3°	3°55.1'+15.0'	71.4°	4°14.2'+16.0'	71.4°	4°33.3'+16.9'	71.5°	4°52.3'+17.9'	71.6°	5°11.2'+18.8'	71.7°	5°30.0'+19.8'	71.8°	19							
20	3°49.9'+14.0'	70.3°	4°10.1'+14.9'	70.4°	4°30.2'+15.9'	70.5°	4°50.2'+16.8'	70.5°	5°10.1'+17.8'	70.6°	5°30.0'+18.7'	70.7°	5°49.8'+19.7'	70.8°	20							
21	4°03.9'+13.9'	69.4°	4°25.0'+14.9'	69.4°	4°46.1'+15.8'	69.5°	5°07.0'+16.8'	69.6°	5°27.9'+17.7'	69.7°	5°48.7'+18.6'	69.8°	6°09.4'+19.6'	69.9°	21							
22	4°17.8'+13.8'	68.4°	4°39.9'+14.8'	68.5°	5°01.9'+15.7'	68.5°	5°23.8'+16.7'	68.6°	5°45.6'+17.6'	68.7°	6°07.4'+18.5'	68.8°	6°29.0'+19.5'	68.9°	22							
23	4°31.7'+13.8'	67.4°	4°54.7'+14.7'	67.5°	5°17.6'+15.6'	67.6°	5°40.5'+16.6'	67.7°	6°03.2'+17.5'	67.7°	6°25.9'+18.4'	67.8°	6°48.5'+19.4'	68.0°	23							
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

91° 269° LHA

Latitude SAME as DECLINATION

91° 269° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° ... Zn = Z LHA < 180° .. Zn= 360-Z

88° 272° LHA

Latitude CONTRARY to Declination

88° 272° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	1°56.4'	-14.5'	90.5°	1°55.9'	-15.6'	90.5°	1°55.3'	-16.6'	90.6°	1°54.8'	-17.6'	90.6°	1°54.1'	-18.6'	90.6°	1°53.5'	-19.6'	90.7°	1°52.8'	-20.5'	90.7°	0
1	1°41.8'	-14.6'	91.5°	1°40.4'	-15.6'	91.5°	1°38.8'	-16.6'	91.5°	1°37.2'	-17.6'	91.5°	1°35.6'	-18.6'	91.6°	1°33.9'	-19.6'	91.6°	1°32.2'	-20.6'	91.6°	1
2	1°27.3'	-14.6'	92.4°	1°24.8'	-15.6'	92.5°	1°22.2'	-16.6'	92.5°	1°19.6'	-17.6'	92.5°	1°17.0'	-18.6'	92.5°	1°14.3'	-19.6'	92.5°	1°11.6'	-20.6'	92.6°	2
3	1°12.7'	-14.6'	93.4°	1°09.2'	-15.6'	93.4°	1°05.6'	-16.6'	93.4°	1°02.0'	-17.6'	93.5°	0°58.4'	-18.6'	93.5°	0°54.7'	-19.6'	93.5°	0°51.1'	-20.6'	93.5°	3
4	0°58.1'	-14.6'	94.4°	0°53.5'	-15.6'	94.4°	0°48.9'	-16.6'	94.4°	0°44.3'	-17.6'	94.4°	0°39.7'	-18.6'	94.4°	0°35.1'	-19.6'	94.4°	0°30.4'	-20.6'	94.4°	4
5	0°43.5'	-14.6'	95.3°	0°37.9'	-15.7'	95.3°	0°32.3'	-16.7'	95.4°	0°26.7'	-17.7'	95.4°	0°21.1'	-18.6'	95.4°	<u>0°15.5' -19.6' 95.4°</u>			<u>0°09.8' -20.6' 95.4°</u>			5
6	0°28.8'	-14.7'	96.3°	0°22.2'	-15.7'	96.3°	<u>0°15.6' -16.7' 96.3°</u>			<u>0°09.0' -17.7' 96.3°</u>			<u>0°02.4' -18.6' 96.3°</u>			0°04.2'	+19.6'	83.7°	0°10.8'	+20.6'	83.7°	6
7	<u>0°14.2' -14.7' 97.3°</u>			<u>0°06.6' -15.7' 97.3°</u>			0°01.0'	+16.7'	82.7°	0°08.6'	+17.7'	82.7°	0°16.2'	+18.6'	82.7°	0°23.8'	+19.6'	82.7°	0°31.4'	+20.6'	82.7°	7
8	0°00.5'	+14.7'	81.8°	0°09.1'	+15.7'	81.8°	0°17.7'	+16.7'	81.8°	0°26.3'	+17.6'	81.8°	0°34.9'	+18.6'	81.8°	0°43.4'	+19.6'	81.8°	0°52.0'	+20.6'	81.8°	8
9	0°15.1'	+14.7'	80.8°	0°24.7'	+15.7'	80.8°	0°34.3'	+16.6'	80.8°	0°43.9'	+17.6'	80.8°	0°53.5'	+18.6'	80.8°	1°03.0'	+19.6'	80.8°	1°12.6'	+20.6'	80.9°	9
10	0°29.8'	+14.6'	79.8°	0°40.4'	+15.6'	79.8°	0°51.0'	+16.6'	79.8°	1°01.5'	+17.6'	79.9°	1°12.1'	+18.6'	79.9°	1°22.6'	+19.6'	79.9°	1°33.2'	+20.5'	79.9°	10
11	0°44.4'	+14.6'	78.8°	0°56.0'	+15.6'	78.9°	1°07.6'	+16.6'	78.9°	1°19.2'	+17.6'	78.9°	1°30.7'	+18.6'	78.9°	1°42.2'	+19.5'	79.0°	1°53.7'	+20.5'	79.0°	11
12	0°59.0'	+14.6'	77.9°	1°11.6'	+15.6'	77.9°	1°24.2'	+16.6'	77.9°	1°36.8'	+17.6'	77.9°	1°49.3'	+18.5'	78.0°	2°01.8'	+19.5'	78.0°	2°14.2'	+20.5'	78.0°	12
13	1°13.7'	+14.6'	76.9°	1°27.2'	+15.6'	76.9°	1°40.8'	+16.6'	77.0°	1°54.3'	+17.5'	77.0°	2°07.8'	+18.5'	77.0°	2°21.3'	+19.5'	77.1°	2°34.7'	+20.4'	77.1°	13
14	1°28.3'	+14.6'	75.9°	1°42.8'	+15.5'	76.0°	1°57.4'	+16.5'	76.0°	2°11.9'	+17.5'	76.0°	2°26.3'	+18.5'	76.1°	2°40.8'	+19.4'	76.1°	2°55.1'	+20.4'	76.2°	14
15	1°42.8'	+14.5'	75.0°	1°58.4'	+15.5'	75.0°	2°13.9'	+16.5'	75.0°	2°29.4'	+17.5'	75.1°	2°44.8'	+18.4'	75.1°	3°00.2'	+19.4'	75.2°	3°15.5'	+20.3'	75.2°	15
16	1°57.4'	+14.5'	74.0°	2°13.9'	+15.5'	74.0°	2°30.4'	+16.4'	74.1°	2°46.8'	+17.4'	74.1°	3°03.2'	+18.4'	74.2°	3°19.6'	+19.3'	74.2°	3°35.9'	+20.3'	74.3°	16
17	2°11.9'	+14.5'	73.0°	2°29.4'	+15.4'	73.1°	2°46.8'	+16.4'	73.1°	3°04.2'	+17.4'	73.2°	3°21.6'	+18.3'	73.2°	3°38.9'	+19.3'	73.3°	3°56.1'	+20.2'	73.3°	17
18	2°26.3'	+14.4'	72.1°	2°44.8'	+15.4'	72.1°	3°03.2'	+16.3'	72.1°	3°21.6'	+17.3'	72.2°	3°39.9'	+18.3'	72.3°	3°58.2'	+19.2'	72.3°	4°16.4'	+20.1'	72.4°	18
19	2°40.8'	+14.4'	71.1°	3°00.2'	+15.3'	71.1°	3°19.6'	+16.3'	71.2°	3°38.9'	+17.2'	71.2°	3°58.2'	+18.2'	71.3°	4°17.4'	+19.1'	71.4°	4°36.5'	+20.1'	71.4°	19
20	2°55.1'	+14.3'	70.1°	3°15.5'	+15.3'	70.2°	3°35.9'	+16.2'	70.2°	3°56.1'	+17.2'	70.3°	4°16.4'	+18.1'	70.3°	4°36.5'	+19.1'	70.4°	4°56.6'	+20.0'	70.5°	20
21	3°09.5'	+14.3'	69.1°	3°30.8'	+15.2'	69.2°	3°52.1'	+16.2'	69.3°	4°13.3'	+17.1'	69.3°	4°34.5'	+18.0'	69.4°	4°55.6'	+19.0'	69.5°	5°16.6'	+19.9'	69.6°	21
22	3°23.7'	+14.2'	68.2°	3°46.0'	+15.2'	68.2°	4°08.3'	+16.1'	68.3°	4°30.4'	+17.0'	68.4°	4°52.5'	+18.0'	68.4°	5°14.5'	+18.9'	68.5°	5°36.5'	+19.8'	68.6°	22
23	3°37.9'	+14.2'	67.2°	4°01.2'	+15.1'	67.3°	4°24.3'	+16.0'	67.3°	4°47.4'	+16.9'	67.4°	5°10.5'	+17.9'	67.5°	5°33.4'	+18.8'	67.6°	5°56.3'	+19.7'	67.7°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

92° 268° LHA

Latitude SAME as DECLINATION

92° 268° LHA

South Lat. LHA > 180° .. Zn = 180-Z LHA < 180° .. Zn= 180+Z

North Lat. LHA > 180° ... Zn = Z LHA < 180° .. Zn= 360-Z

87° 273° LHA

Latitude CONTRARY to Declination

87° 273° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	2°54.6'	-14.6'	90.7°	2°53.9'	-15.6'	90.8°	2°53.0'	-16.6'	90.8°	2°52.1'	-17.6'	90.9°	2°51.2'	-18.6'	90.9°	2°50.2'	-19.6'	91.0°	2°49.1'	-20.6'	91.0°	0
1	2°40.0'	-14.6'	91.7°	2°38.3'	-15.6'	91.7°	2°36.4'	-16.6'	91.8°	2°34.5'	-17.6'	91.8°	2°32.6'	-18.6'	91.9°	2°30.6'	-19.6'	91.9°	2°28.6'	-20.6'	92.0°	1
2	2°25.4'	-14.6'	92.7°	2°22.7'	-15.7'	92.7°	2°19.8'	-16.7'	92.8°	2°16.9'	-17.7'	92.8°	2°14.0'	-18.7'	92.8°	2°11.0'	-19.7'	92.9°	2°08.0'	-20.6'	92.9°	2
3	2°10.8'	-14.7'	93.6°	2°07.0'	-15.7'	93.7°	2°03.1'	-16.7'	93.7°	1°59.2'	-17.7'	93.7°	1°55.3'	-18.7'	93.8°	1°51.3'	-19.7'	93.8°	1°47.3'	-20.7'	93.8°	3
4	1°56.2'	-14.7'	94.6°	1°51.3'	-15.7'	94.6°	1°46.4'	-16.7'	94.7°	1°41.5'	-17.7'	94.7°	1°36.6'	-18.7'	94.7°	1°31.6'	-19.7'	94.8°	1°26.6'	-20.7'	94.8°	4
5	1°41.4'	-14.7'	95.6°	1°35.6'	-15.8'	95.6°	1°29.7'	-16.8'	95.6°	1°23.8'	-17.8'	95.7°	1°17.9'	-18.7'	95.7°	1°11.9'	-19.7'	95.7°	1°06.0'	-20.7'	95.7°	5
6	1°26.7'	-14.8'	96.5°	1°19.8'	-15.8'	96.6°	1°13.0'	-16.8'	96.6°	1°06.1'	-17.8'	96.6°	0°59.1'	-18.8'	96.6°	0°52.2'	-19.7'	96.6°	0°45.2'	-20.7'	96.7°	6
7	1°11.9'	-14.8'	97.5°	1°04.1'	-15.8'	97.5°	0°56.2'	-16.8'	97.6°	0°48.3'	-17.8'	97.6°	0°40.4'	-18.8'	97.6°	0°32.4'	-19.8'	97.6°	0°24.5'	-20.7'	97.6°	7
8	0°57.1'	-14.8'	98.5°	0°48.3'	-15.8'	98.5°	0°39.4'	-16.8'	98.5°	0°30.5'	-17.8'	98.5°	0°21.6'	-18.8'	98.5°	<u>0°12.7' -19.8' 98.5°</u>			<u>0°03.8' -20.7' 98.5°</u>			8
9	0°42.3'	-14.8'	99.5°	0°32.5'	-15.8'	99.5°	0°22.6'	-16.8'	99.5°	<u>0°12.7' -17.8' 99.5°</u>			<u>0°02.8' -18.8' 99.5°</u>			0°07.1'	+19.8'	80.5°	0°16.9'	+20.7'	80.5°	9
10	0°27.5'	-14.8'	100.4°	0°16.6'	-15.8'	100.4°	<u>0°05.8' -16.8' 100.4°</u>			0°05.1'	+17.8'	79.6°	0°16.0'	+18.8'	79.6°	0°26.8'	+19.7'	79.6°	0°37.7'	+20.7'	79.6°	10
11	<u>0°12.7' -14.8' 101.4°</u>			<u>0°00.8' -15.8' 101.4°</u>			0°11.0'	+16.8'	78.6°	0°22.9'	+17.8'	78.6°	0°34.7'	+18.8'	78.6°	0°46.6'	+19.7'	78.6°	0°58.4'	+20.7'	78.6°	11
12	0°02.2'	+14.8'	77.6°	0°15.0'	+15.8'	77.6°	0°27.8'	+16.8'	77.6°	0°40.7'	+17.8'	77.7°	0°53.5'	+18.8'	77.7°	1°06.3'	+19.7'	77.7°	1°19.1'	+20.7'	77.7°	12
13	0°17.0'	+14.8'	76.7°	0°30.8'	+15.8'	76.7°	0°44.6'	+16.8'	76.7°	0°58.5'	+17.8'	76.7°	1°12.2'	+18.7'	76.7°	1°26.0'	+19.7'	76.7°	1°39.8'	+20.7'	76.8°	13
14	0°31.8'	+14.8'	75.7°	0°46.6'	+15.8'	75.7°	1°01.4'	+16.8'	75.7°	1°16.2'	+17.7'	75.7°	1°31.0'	+18.7'	75.8°	1°45.7'	+19.7'	75.8°	2°00.4'	+20.6'	75.8°	14
15	0°46.6'	+14.8'	74.7°	1°02.4'	+15.8'	74.7°	1°18.2'	+16.7'	74.8°	1°34.0'	+17.7'	74.8°	1°49.7'	+18.7'	74.8°	2°05.4'	+19.6'	74.8°	2°21.0'	+20.6'	74.9°	15
16	1°01.4'	+14.8'	73.8°	1°18.2'	+15.8'	73.8°	1°34.9'	+16.7'	73.8°	1°51.7'	+17.7'	73.8°	2°08.4'	+18.6'	73.9°	2°25.0'	+19.6'	73.9°	2°41.6'	+20.5'	73.9°	16
17	1°16.2'	+14.8'	72.8°	1°34.0'	+15.7'	72.8°	1°51.7'	+16.7'	72.8°	2°09.4'	+17.6'	72.9°	2°27.0'	+18.6'	72.9°	2°44.6'	+19.5'	73.0°	3°02.2'	+20.5'	73.0°	17
18	1°31.0'	+14.7'	71.8°	1°49.7'	+15.7'	71.8°	2°08.4'	+16.7'	71.9°	2°27.0'	+17.6'	71.9°	2°45.6'	+18.6'	72.0°	3°04.2'	+19.5'	72.0°	3°22.7'	+20.4'	72.1°	18
19	1°45.7'	+14.7'	70.9°	2°05.4'	+15.7'	70.9°	2°25.0'	+16.6'	70.9°	2°44.6'	+17.6'	71.0°	3°04.2'	+18.5'	71.0°	3°23.7'	+19.4'	71.1°	3°43.1'	+20.4'	71.1°	19
20	2°00.4'	+14.7'	69.9°	2°21.0'	+15.6'	69.9°	2°41.6'	+16.6'	70.0°	3°02.2'	+17.5'	70.0°	3°22.7'	+18.4'	70.1°	3°43.1'	+19.4'	70.1°	4°03.5'	+20.3'	70.2°	20
21	2°15.1'	+14.6'	68.9°	2°36.7'	+15.6'	69.0°	2°58.2'	+16.5'	69.0°	3°19.7'	+17.5'	69.0°	3°41.1'	+18.4'	69.1°	4°02.5'	+19.3'	69.2°	4°23.8'	+20.2'	69.2°	21
22	2°29.7'	+14.6'	67.9°	2°52.2'	+15.5'	68.0°	3°14.7'	+16.5'	68.0°	3°37.1'	+17.4'	68.1°	3°59.5'	+18.3'	68.2°	4°21.8'	+19.2'	68.2°	4°44.0'	+20.2'	68.3°	22
23	2°44.3'																					

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

86° 274° LHA

Latitude CONTRARY to Declination

86° 274° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	3°52.8'	-14.6'	91.0°	3°51.8'	-15.6'	91.0°	3°50.7'	-16.6'	91.1°	3°49.5'	-17.6'	91.2°	3°48.2'	-18.6'	91.2°	3°46.9'	-19.6'	91.3°	3°45.5'	-20.6'	91.4°	0
1	3°38.2'	-14.6'	91.9°	3°36.2'	-15.7'	92.0°	3°34.1'	-16.7'	92.1°	3°31.9'	-17.7'	92.1°	3°29.6'	-18.7'	92.2°	3°27.3'	-19.7'	92.3°	3°24.9'	-20.6'	92.3°	1
2	3°23.6'	-14.7'	92.9°	3°20.6'	-15.7'	93.0°	3°17.4'	-16.7'	93.0°	3°14.2'	-17.7'	93.1°	3°11.0'	-18.7'	93.1°	3°07.6'	-19.7'	93.2°	3°04.3'	-20.7'	93.3°	2
3	3°08.9'	-14.8'	93.9°	3°04.8'	-15.8'	93.9°	3°00.7'	-16.8'	94.0°	2°56.5'	-17.8'	94.0°	2°52.2'	-18.8'	94.1°	2°47.9'	-19.8'	94.1°	2°43.6'	-20.7'	94.2°	3
4	2°54.2'	-14.8'	94.9°	2°49.1'	-15.8'	94.9°	2°43.9'	-16.8'	95.0°	2°38.7'	-17.8'	95.0°	2°33.5'	-18.8'	95.0°	2°28.2'	-19.8'	95.1°	2°22.8'	-20.8'	95.1°	4
5	2°39.4'	-14.9'	95.8°	2°33.3'	-15.9'	95.9°	2°27.1'	-16.9'	95.9°	2°20.9'	-17.9'	96.0°	2°14.6'	-18.8'	96.0°	2°08.4'	-19.8'	96.0°	2°02.0'	-20.8'	96.1°	5
6	2°24.5'	-14.9'	96.8°	2°17.4'	-15.9'	96.8°	2°10.2'	-16.9'	96.9°	2°03.0'	-17.9'	96.9°	1°55.8'	-18.9'	96.9°	1°48.5'	-19.9'	97.0°	1°41.2'	-20.8'	97.0°	6
7	2°09.6'	-14.9'	97.8°	2°01.5'	-15.9'	97.8°	1°53.3'	-16.9'	97.8°	1°45.1'	-17.9'	97.9°	1°36.9'	-18.9'	97.9°	1°28.7'	-19.9'	97.9°	1°20.4'	-20.9'	97.9°	7
8	1°54.7'	-15.0'	98.7°	1°45.6'	-16.0'	98.8°	1°36.4'	-17.0'	98.8°	1°27.2'	-17.9'	98.8°	1°18.0'	-18.9'	98.8°	1°08.8'	-19.9'	98.9°	0°59.5'	-20.9'	98.9°	8
9	1°39.7'	-15.0'	99.7°	1°29.6'	-16.0'	99.7°	1°19.5'	-17.0'	99.8°	1°09.3'	-18.0'	99.8°	0°59.1'	-18.9'	99.8°	0°48.9'	-19.9'	99.8°	0°38.6'	-20.9'	99.8°	9
10	1°24.7'	-15.0'	100.7°	1°13.6'	-16.0'	100.7°	1°02.5'	-17.0'	100.7°	0°51.3'	-18.0'	100.7°	0°40.1'	-19.0'	100.7°	0°28.9'	-19.9'	100.8°	<u>0°17.7'</u>	<u>-20.9'</u>	<u>100.8°</u>	10
11	1°09.7'	-15.0'	101.6°	0°57.6'	-16.0'	101.7°	0°45.5'	-17.0'	101.7°	0°33.3'	-18.0'	101.7°	0°21.2'	-19.0'	101.7°	<u>0°09.0'</u>	<u>-19.9'</u>	<u>101.7°</u>	0°03.1'	+20.9'	78.3°	11
12	0°54.7'	-15.1'	102.6°	0°41.6'	-16.0'	102.6°	0°28.5'	-17.0'	102.6°	<u>0°15.3'</u>	<u>-18.0'</u>	<u>102.6°</u>	<u>0°02.2'</u>	<u>-19.0'</u>	<u>102.6°</u>	0°10.9'	+19.9'	77.4°	0°24.0'	+20.9'	77.4°	12
13	0°39.6'	-15.1'	103.6°	0°25.5'	-16.0'	103.6°	<u>0°11.5'</u>	<u>-17.0'</u>	<u>103.6°</u>	0°02.6'	+18.0'	76.4°	0°16.7'	+19.0'	76.4°	0°30.8'	+19.9'	76.4°	0°44.9'	+20.9'	76.4°	13
14	0°24.6'	-15.1'	104.5°	<u>0°09.5'</u>	<u>-16.0'</u>	<u>104.5°</u>	0°05.6'	+17.0'	75.5°	0°20.6'	+18.0'	75.5°	0°35.7'	+18.9'	75.5°	0°50.8'	+19.9'	75.5°	1°05.8'	+20.9'	75.5°	14
15	<u>0°09.5'</u>	<u>-15.1'</u>	<u>105.5°</u>	0°06.5'	+16.0'	74.5°	0°22.6'	+17.0'	74.5°	0°38.6'	+18.0'	74.5°	0°54.7'	+18.9'	74.5°	1°10.7'	+19.9'	74.5°	1°26.7'	+20.8'	74.6°	15
16	0°05.6'	+15.1'	73.5°	0°22.6'	+16.0'	73.5°	0°39.6'	+17.0'	73.5°	0°56.6'	+18.0'	73.5°	1°13.6'	+18.9'	73.6°	1°30.6'	+19.9'	73.6°	1°47.5'	+20.8'	73.6°	16
17	0°20.6'	+15.1'	72.6°	0°38.6'	+16.0'	72.6°	0°56.6'	+17.0'	72.6°	1°14.6'	+17.9'	72.6°	1°32.5'	+18.9'	72.6°	1°50.4'	+19.8'	72.6°	2°08.3'	+20.8'	72.7°	17
18	0°35.7'	+15.1'	71.6°	0°54.7'	+16.0'	71.6°	1°13.6'	+17.0'	71.6°	1°32.5'	+17.9'	71.6°	1°51.4'	+18.9'	71.7°	2°10.2'	+19.8'	71.7°	2°29.1'	+20.7'	71.7°	18
19	0°50.8'	+15.0'	70.6°	1°10.7'	+16.0'	70.6°	1°30.6'	+16.9'	70.7°	1°50.4'	+17.9'	70.7°	2°10.2'	+18.8'	70.7°	2°30.0'	+19.8'	70.8°	2°49.8'	+20.7'	70.8°	19
20	1°05.8'	+15.0'	69.6°	1°26.7'	+16.0'	69.7°	1°47.5'	+16.9'	69.7°	2°08.3'	+17.8'	69.7°	2°29.1'	+18.8'	69.8°	2°49.8'	+19.7'	69.8°	3°10.5'	+20.6'	69.9°	20
21	1°20.8'	+15.0'	68.7°	1°42.6'	+15.9'	68.7°	2°04.4'	+16.9'	68.7°	2°26.1'	+17.8'	68.8°	2°47.8'	+18.7'	68.8°	3°09.5'	+19.7'	68.9°	3°31.1'	+20.6'	68.9°	21
22	1°35.8'	+15.0'	67.7°	1°58.6'	+15.9'	67.7°	2°21.3'	+16.8'	67.8°	2°44.0'	+17.8'	67.8°	3°06.6'	+18.7'	67.9°	3°29.2'	+19.6'	67.9°	3°51.7'	+20.5'	68.0°	22
23	1°50.8'	+14.9'	66.7°	2°14.5'	+15.9'	66.8°	2°38.1'	+16.8'	66.8°	3°01.7'	+17.7'	66.9°	3°25.3'	+18.6'	66.9°	3°48.8'	+19.5'	67.0°	4°12.2'	+20.4'	67.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

94° 266° LHA

Latitude SAME as DECLINATION

94° 266° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

85° 275° LHA

Latitude CONTRARY to Declination

85° 275° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	4°51.0'	-14.6'	91.2°	4°49.8'	-15.6'	91.3°	4°48.4'	-16.6'	91.4°	4°46.9'	-17.6'	91.5°	4°45.3'	-18.6'	91.5°	4°43.6'	-19.6'	91.6°	4°41.9'	-20.6'	91.7°	0
1	4°36.4'	-14.7'	92.2°	4°34.1'	-15.7'	92.3°	4°31.7'	-16.7'	92.3°	4°29.2'	-17.7'	92.4°	4°26.6'	-18.7'	92.5°	4°24.0'	-19.7'	92.6°	4°21.2'	-20.7'	92.7°	1
2	4°21.7'	-14.8'	93.2°	4°18.4'	-15.8'	93.2°	4°15.0'	-16.8'	93.3°	4°11.5'	-17.8'	93.4°	4°07.9'	-18.8'	93.5°	4°04.3'	-19.8'	93.5°	4°00.5'	-20.8'	93.6°	2
3	4°07.0'	-14.8'	94.1°	4°02.6'	-15.8'	94.2°	3°58.2'	-16.9'	94.3°	3°53.7'	-17.9'	94.3°	3°49.1'	-18.8'	94.4°	3°44.5'	-19.8'	94.5°	3°39.8'	-20.8'	94.5°	3
4	3°52.2'	-14.9'	95.1°	3°46.8'	-15.9'	95.2°	3°41.4'	-16.9'	95.2°	3°35.9'	-17.9'	95.3°	3°30.3'	-18.9'	95.4°	3°24.7'	-19.9'	95.4°	3°19.0'	-20.9'	95.5°	4
5	3°37.3'	-15.0'	96.1°	3°30.9'	-16.0'	96.1°	3°24.5'	-17.0'	96.2°	3°17.9'	-18.0'	96.3°	3°11.4'	-19.0'	96.3°	3°04.8'	-19.9'	96.4°	2°58.1'	-20.9'	96.4°	5
6	3°22.3'	-15.0'	97.0°	3°14.9'	-16.0'	97.1°	3°07.5'	-17.0'	97.2°	2°60.0'	-18.0'	97.2°	2°52.4'	-19.0'	97.3°	2°44.8'	-20.0'	97.3°	2°37.2'	-21.0'	97.4°	6
7	3°07.3'	-15.1'	98.0°	2°58.9'	-16.1'	98.1°	2°50.5'	-17.1'	98.1°	2°42.0'	-18.1'	98.2°	2°33.4'	-19.0'	98.2°	2°24.8'	-20.0'	98.3°	2°16.2'	-21.0'	98.3°	7
8	2°52.2'	-15.1'	99.0°	2°42.8'	-16.1'	99.0°	2°33.4'	-17.1'	99.1°	2°23.9'	-18.1'	99.1°	2°14.4'	-19.1'	99.2°	2°04.8'	-20.1'	99.2°	1°55.2'	-21.0'	99.2°	8
9	2°37.1'	-15.2'	100.0°	2°26.7'	-16.2'	100.0°	2°16.3'	-17.2'	100.0°	2°05.8'	-18.1'	100.1°	1°55.3'	-19.1'	100.1°	1°44.7'	-20.1'	100.1°	1°34.2'	-21.1'	100.2°	9
10	2°21.9'	-15.2'	100.9°	2°10.5'	-16.2'	101.0°	1°59.1'	-17.2'	101.0°	1°47.7'	-18.2'	101.0°	1°36.2'	-19.1'	101.1°	1°24.6'	-20.1'	101.1°	1°13.1'	-21.1'	101.1°	10
11	2°06.7'	-15.2'	101.9°	1°54.3'	-16.2'	101.9°	1°41.9'	-17.2'	102.0°	1°29.5'	-18.2'	102.0°	1°17.0'	-19.2'	102.0°	1°04.5'	-20.1'	102.0°	0°52.0'	-21.1'	102.0°	11
12	1°51.5'	-15.3'	102.9°	1°38.1'	-16.3'	102.9°	1°24.7'	-17.2'	102.9°	1°11.3'	-18.2'	102.9°	0°57.9'	-19.2'	103.0°	0°44.4'	-20.1'	103.0°	0°30.9'	-21.1'	103.0°	12
13	1°36.2'	-15.3'	103.8°	1°21.8'	-16.3'	103.8°	1°07.5'	-17.3'	103.9°	0°53.1'	-18.2'	103.9°	0°38.7'	-19.2'	103.9°	0°24.3'	-20.1'	103.9°	<u>0°09.8'</u>	<u>-21.1'</u>	<u>103.9°</u>	13
14	1°20.9'	-15.3'	104.8°	1°05.6'	-16.3'	104.8°	0°50.2'	-17.3'	104.8°	0°34.9'	-18.2'	104.8°	0°19.5'	-19.2'	104.8°	<u>0°04.1'</u>	<u>-20.1'</u>	<u>104.8°</u>	0°11.3'	+21.1'	75.2°	14
15	1°05.6'	-15.3'	105.8°	0°49.3'	-16.3'	105.8°	0°32.9'	-17.3'	105.8°	<u>0°16.6'</u>	<u>-18.2'</u>	<u>105.8°</u>	<u>0°00.3'</u>	<u>-19.2'</u>	<u>105.8°</u>	0°16.0'	+20.1'	74.2°	0°32.4'	+21.1'	74.2°	15
16	0°50.2'	-15.4'	106.7°	0°32.9'	-16.3'	106.7°	<u>0°15.7'</u>	<u>-17.3'</u>	<u>106.7°</u>	0°01.6'	+18.2'	73.3°	0°18.9'	+19.2'	73.3°	0°36.2'	+20.1'	73.3°	0°53.4'	+21.1'	73.3°	16
17	0°34.9'	-15.4'	107.7°	0°16.6'	-16.3'	107.7°	0°01.6'	+17.3'	72.3°	0°19.9'	+18.2'	72.3°	0°38.1'	+19.2'	72.3°	0°56.3'	+20.1'	72.3°	1°14.5'	+21.1'	72.3°	17
18	0°19.5'	-15.4'	108.7°	<u>0°00.3'</u>	<u>-16.3'</u>	<u>108.7°</u>	0°18.9'	+17.3'	71.3°	0°38.1'	+18.2'	71.4°	0°57.3'	+19.2'	71.4°	1°16.4'	+19.1'	71.4°	1°35.6'	+21.0'	71.4°	18
19	<u>0°04.1'</u>	<u>-15.4'</u>	<u>109.6°</u>	0°16.0'	+16.3'	70.4°	0°36.2'	+17.3'	70.4°	0°56.3'	+18.2'	70.4°	1°16.4'	+19.1'	70.4°	1°36.5'	+20.1'	70.4°	1°56.6'	+21.0'	70.5°	19
20	0°11.3'	+15.4'	69.4°	0°32.4'	+16.3'	69.4°	0°53.4'	+17.3'	69.4°	1°14.5'	+18.2'	69.4°	1°35.6'	+19.1'	69.5°	1°56.6'	+20.0'	69.5°	2°17.6'	+21.0'	69.5°	20
21	0°26.6'	+15.4'	68.4°	0°48.7'	+16.3'	68.5°	1°10.7'	+17.2'	68.5°	1°32.7'	+18.2'	68.5°	1°54.7'	+19.1'	68.5°	2°16.6'	+20.0'	68.6°	2°38.6'	+20.9'	68.6°	21
22	0°42.0'	+15.4'	67.5°	1°05.0'	+16.3'	67.5°	1°27.9'	+17														

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

84° 276° LHA

Latitude CONTRARY to Declination

84° 276° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	5°49.2'	-14.6'	91.5°	5°47.7'	-15.7'	91.6°	5°46.0'	-16.7'	91.7°	5°44.2'	-17.7'	91.8°	5°42.3'	-18.7'	91.9°	5°40.3'	-19.7'	92.0°	5°38.2'	-20.7'	92.1°	0
1	5°34.6'	-14.7'	92.4°	5°32.0'	-15.8'	92.5°	5°29.3'	-16.8'	92.6°	5°26.5'	-17.8'	92.7°	5°23.6'	-18.8'	92.8°	5°20.6'	-19.8'	92.9°	5°17.6'	-20.8'	93.0°	1
2	5°19.8'	-14.8'	93.4°	5°16.3'	-15.8'	93.5°	5°12.6'	-16.9'	93.6°	5°08.8'	-17.9'	93.7°	5°04.9'	-18.9'	93.8°	5°00.9'	-19.8'	93.9°	4°56.8'	-20.8'	93.9°	2
3	5°05.1'	-14.9'	94.4°	5°00.4'	-15.9'	94.5°	4°55.7'	-16.9'	94.6°	4°50.9'	-17.9'	94.6°	4°46.0'	-18.9'	94.7°	4°41.0'	-19.9'	94.8°	4°36.0'	-20.9'	94.9°	3
4	4°50.1'	-15.0'	95.4°	4°44.5'	-16.0'	95.4°	4°38.8'	-17.0'	95.5°	4°33.0'	-18.0'	95.6°	4°27.1'	-19.0'	95.7°	4°21.1'	-20.0'	95.8°	4°15.1'	-21.0'	95.8°	4
5	4°35.2'	-15.1'	96.3°	4°28.5'	-16.1'	96.4°	4°21.8'	-17.1'	96.5°	4°15.0'	-18.1'	96.6°	4°08.1'	-19.1'	96.6°	4°01.1'	-20.1'	96.7°	3°54.1'	-21.0'	96.8°	5
6	4°20.1'	-15.2'	97.3°	4°12.4'	-16.2'	97.4°	4°04.7'	-17.2'	97.4°	3°56.9'	-18.1'	97.5°	3°49.0'	-19.1'	97.6°	3°41.1'	-20.1'	97.6°	3°33.1'	-21.1'	97.7°	6
7	4°04.9'	-15.3'	98.3°	3°56.3'	-16.2'	98.3°	3°47.5'	-17.2'	98.4°	3°38.7'	-18.2'	98.5°	3°29.9'	-19.2'	98.5°	3°20.9'	-20.2'	98.6°	3°12.0'	-21.1'	98.6°	7
8	3°49.7'	-15.3'	99.2°	3°40.0'	-16.3'	99.3°	3°30.3'	-17.3'	99.4°	3°20.5'	-18.3'	99.4°	3°10.7'	-19.2'	99.5°	3°00.8'	-20.2'	99.5°	2°50.8'	-21.2'	99.6°	8
9	3°34.4'	-15.3'	100.2°	3°23.8'	-16.3'	100.3°	3°13.0'	-17.3'	100.3°	3°02.3'	-18.3'	100.4°	2°51.4'	-19.3'	100.4°	2°40.6'	-20.3'	100.5°	2°29.6'	-21.2'	100.5°	9
10	3°19.1'	-15.4'	101.2°	3°07.4'	-16.4'	101.2°	2°55.7'	-17.4'	101.3°	2°43.9'	-18.4'	101.3°	2°32.1'	-19.3'	101.4°	2°20.3'	-20.3'	101.4°	2°08.4'	-21.3'	101.5°	10
11	3°03.7'	-15.5'	102.1°	2°51.0'	-16.4'	102.2°	2°38.3'	-17.4'	102.2°	2°25.6'	-18.4'	102.3°	2°12.8'	-19.4'	102.3°	1°60.0'	-20.3'	102.4°	1°47.1'	-21.3'	102.4°	11
12	2°48.2'	-15.5'	103.1°	2°34.6'	-16.5'	103.2°	2°20.9'	-17.5'	103.2°	2°07.2'	-18.4'	103.2°	1°53.4'	-19.4'	103.3°	1°39.7'	-20.4'	103.3°	1°25.8'	-21.3'	103.3°	12
13	2°32.7'	-15.5'	104.1°	2°18.1'	-16.5'	104.1°	2°03.4'	-17.5'	104.2°	1°48.8'	-18.5'	104.2°	1°34.0'	-19.4'	104.2°	1°19.3'	-20.4'	104.2°	1°04.5'	-21.3'	104.3°	13
14	2°17.1'	-15.6'	105.0°	2°01.6'	-16.6'	105.1°	1°45.9'	-17.5'	105.1°	1°30.3'	-18.5'	105.1°	1°14.6'	-19.4'	105.2°	0°58.9'	-20.4'	105.2°	0°43.2'	-21.3'	105.2°	14
15	2°01.6'	-15.6'	106.0°	1°45.0'	-16.6'	106.0°	1°28.4'	-17.6'	106.1°	1°11.8'	-18.5'	106.1°	0°55.2'	-19.5'	106.1°	0°38.5'	-20.4'	106.1°	0°21.9'	-21.3'	106.1°	15
16	1°45.9'	-15.7'	107.0°	1°28.4'	-16.6'	107.0°	1°10.9'	-17.6'	107.0°	0°53.3'	-18.5'	107.0°	0°35.7'	-19.5'	107.1°	<u>0°18.1'</u>	-20.4'	107.1°	0°00.5'	-21.3'	107.1°	16
17	1°30.3'	-15.7'	107.9°	1°11.8'	-16.6'	108.0°	0°53.3'	-17.6'	108.0°	0°34.8'	-18.5'	108.0°	<u>0°16.2'</u>	-19.5'	108.0°	0°02.3'	+20.4'	72.0°	0°20.8'	+21.3'	72.0°	17
18	1°14.6'	-15.7'	108.9°	0°55.2'	-16.7'	108.9°	0°35.7'	-17.6'	108.9°	<u>0°16.2'</u>	-18.5'	108.9°	0°03.2'	+19.5'	71.1°	0°22.7'	+20.4'	71.1°	0°42.2'	+21.3'	71.1°	18
19	0°58.9'	-15.7'	109.9°	0°38.5'	-16.7'	109.9°	0°18.1'	-17.6'	109.9°	0°02.3'	+18.5'	70.1°	0°22.7'	+19.5'	70.1°	0°43.1'	+20.4'	70.1°	1°03.5'	+21.3'	70.1°	19
20	0°43.2'	-15.7'	110.8°	0°21.9'	-16.7'	110.8°	<u>0°00.5'</u>	-17.6'	110.8°	0°20.8'	+18.5'	69.2°	0°42.2'	+19.5'	69.2°	1°03.5'	+20.4'	69.2°	1°24.8'	+21.3'	69.2°	20
21	0°27.5'	-15.7'	111.8°	<u>0°05.2'</u>	-16.7'	111.8°	0°17.1'	+17.6'	68.2°	0°39.4'	+18.5'	68.2°	1°01.6'	+19.4'	68.2°	1°23.9'	+20.4'	68.2°	1°46.1'	+21.3'	68.3°	21
22	<u>0°11.7'</u>	-15.7'	112.8°	0°11.5'	+16.7'	67.2°	0°34.7'	+17.6'	67.2°	0°57.9'	+18.5'	67.3°	1°21.1'	+19.4'	67.3°	1°44.3'	+20.3'	67.3°	2°07.4'	+21.2'	67.3°	22
23	0°04.0'	+15.7'	66.3°	0°28.1'	+16.7'	66.3°	0°52.3'	+17.6'	66.3°	1°16.4'	+18.5'	66.3°	1°40.5'	+19.4'	66.3°	2°04.6'	+20.3'	66.4°	2°28.6'	+21.2'	66.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

96° 264° LHA

Latitude SAME as DECLINATION

96° 264° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

83° 277° LHA

Latitude CONTRARY to Declination

83° 277° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	6°47.4'	-14.7'	91.7°	6°45.6'	-15.7'	91.8°	6°43.7'	-16.7'	91.9°	6°41.6'	-17.7'	92.1°	6°39.3'	-18.7'	92.2°	6°37.0'	-19.7'	92.3°	6°34.6'	-20.7'	92.4°	0
1	6°32.7'	-14.8'	92.7°	6°29.9'	-15.8'	92.8°	6°26.9'	-16.8'	92.9°	6°23.8'	-17.8'	93.0°	6°20.6'	-18.8'	93.1°	6°17.3'	-19.8'	93.2°	6°13.8'	-20.8'	93.3°	1
2	6°18.0'	-14.9'	93.7°	6°14.1'	-15.9'	93.8°	6°10.1'	-16.9'	93.9°	6°06.0'	-17.9'	94.0°	6°01.8'	-18.9'	94.1°	5°57.5'	-19.9'	94.2°	5°53.0'	-20.9'	94.3°	2
3	6°03.1'	-15.0'	94.6°	5°58.2'	-16.0'	94.7°	5°53.2'	-17.0'	94.8°	5°48.1'	-18.0'	94.9°	5°42.9'	-19.0'	95.0°	5°37.6'	-20.0'	95.1°	5°32.1'	-21.0'	95.2°	3
4	5°48.1'	-15.1'	95.6°	5°42.2'	-16.1'	95.7°	5°36.2'	-17.1'	95.8°	5°30.1'	-18.1'	95.9°	5°23.9'	-19.1'	96.0°	5°17.5'	-20.1'	96.1°	5°11.1'	-21.1'	96.2°	4
5	5°33.0'	-15.2'	96.6°	5°26.1'	-16.2'	96.7°	5°19.1'	-17.2'	96.8°	5°12.0'	-18.2'	96.9°	5°04.7'	-19.2'	96.9°	4°57.4'	-20.2'	97.0°	4°50.1'	-21.2'	97.1°	5
6	5°17.8'	-15.3'	97.5°	5°09.9'	-16.3'	97.6°	5°01.9'	-17.3'	97.7°	4°53.8'	-18.3'	97.8°	4°45.6'	-19.3'	97.9°	4°37.3'	-20.3'	98.0°	4°28.9'	-21.2'	98.1°	6
7	5°02.5'	-15.4'	98.5°	4°53.6'	-16.4'	98.6°	4°44.6'	-17.4'	98.7°	4°35.5'	-18.4'	98.8°	4°26.3'	-19.3'	98.8°	4°17.0'	-20.3'	98.9°	4°07.7'	-21.3'	99.0°	7
8	4°47.1'	-15.5'	99.5°	4°37.2'	-16.5'	99.6°	4°27.2'	-17.4'	99.6°	4°17.1'	-18.4'	99.7°	4°06.9'	-19.4'	99.8°	3°56.7'	-20.4'	99.9°	3°46.4'	-21.4'	99.9°	8
9	4°31.7'	-15.5'	100.5°	4°20.8'	-16.5'	100.5°	4°09.8'	-17.5'	100.6°	3°58.7'	-18.5'	100.7°	3°47.5'	-19.5'	100.7°	3°36.3'	-20.4'	100.8°	3°25.0'	-21.4'	100.9°	9
10	4°16.2'	-15.6'	101.4°	4°04.2'	-16.6'	101.5°	3°52.2'	-17.6'	101.6°	3°40.2'	-18.6'	101.6°	3°28.1'	-19.5'	101.7°	3°15.9'	-20.5'	101.7°	3°03.6'	-21.5'	101.8°	10
11	4°00.5'	-15.7'	102.4°	3°47.6'	-16.7'	102.5°	3°34.7'	-17.6'	102.5°	3°21.6'	-18.6'	102.6°	3°08.5'	-19.6'	102.6°	2°55.4'	-20.5'	102.7°	2°42.2'	-21.5'	102.7°	11
12	3°44.9'	-15.7'	103.4°	3°31.0'	-16.7'	103.4°	3°17.0'	-17.7'	103.5°	3°03.0'	-18.7'	103.5°	2°48.9'	-19.6'	103.6°	2°34.8'	-20.6'	103.6°	2°20.7'	-21.5'	103.7°	12
13	3°29.1'	-15.8'	104.3°	3°14.3'	-16.8'	104.4°	2°59.3'	-17.7'	104.4°	2°44.3'	-18.7'	104.5°	2°29.3'	-19.7'	104.5°	2°14.2'	-20.6'	104.6°	1°59.1'	-21.6'	104.6°	13
14	3°13.3'	-15.9'	105.3°	2°57.5'	-16.8'	105.3°	2°41.6'	-17.8'	105.4°	2°25.6'	-18.7'	105.4°	2°09.6'	-19.7'	105.5°	1°53.6'	-20.7'	105.5°	1°37.6'	-21.6'	105.5°	14
15	2°57.5'	-15.9'	106.3°	2°40.7'	-16.9'	106.3°	2°23.8'	-17.8'	106.3°	2°06.9'	-18.8'	106.4°	1°49.9'	-19.7'	106.4°	1°33.0'	-20.7'	106.4°	1°16.0'	-21.6'	106.5°	15
16	2°41.6'	-15.9'	107.2°	2°23.8'	-16.9'	107.3°	2°06.0'	-17.9'	107.3°	1°48.1'	-18.8'	107.3°	1°30.2'	-19.8'	107.4°	1°12.3'	-20.7'	107.4°	0°54.4'	-21.6'	107.4°	16
17	2°25.6'	-16.0'	108.2°	2°06.9'	-16.9'	108.2°	1°48.1'	-17.9'	108.3°	1°29.3'	-18.8'	108.3°	1°10.5'	-19.8'	108.3°	0°51.6'	-20.7'	108.3°	0°32.7'	-21.6'	108.3°	17
18	2°09.6'	-16.0'	109.2°	1°49.9'	-17.0'	109.2°	1°30.2'	-17.9'	109.2°	1°10.5'	-18.9'	109.2°	0°50.7'	-19.8'	109.3°	0°30.9'	-20.7'	109.3°	<u>0°11.1'</u>	-21.6'	109.3°	18
19	1°53.6'	-16.1'	110.1°	1°33.0'	-17.0'	110.1°	1°12.3'	-17.9'	110.2°	0°51.6'	-18.9'	110.2°	0°30.9'	-19.8'	110.2°	<u>0°10.2'</u>	-20.7'	110.2°	0°10.6'	+21.6'	69.8°	19
20	1°37.6'	-16.1'	111.1°	1°16.0'	-17.0'	111.1°	0°54.4'	-18.0'	111.1°	0°32.7'	-18.9'	111.1°	<u>0°11.1'</u>	-19.8'	111.1°	0°10.6'	+20.7'	68.9°	0°32.2'	+21.6'	68.9°	20
21	1°21.5'	-16.1'	112.0°	0°58.9'	-17.0'	112.1°	0°36.4'	-18.0'	112.1°	<u>0°13.8'</u>	-18.9'	112.1°	0°08.7'	+19.8'	67.9°	0°31.3'	+20.7'	67.9°	0°53.8'	+21.6'	67.9°	21
22	1°05.4'	-16.1'	113.0°	0°41.9'	-17.1'	113.0°	0°18.4'	-18.0'	113.0°	0°05.0'	+18.9'	67.0°	0°28.									

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

82° 278° LHA

Latitude CONTRARY to Declination

82° 278° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	7°45.6'	-14.7'	91.9°	7°43.5'	-15.7'	92.1°	7°41.3'	-16.8'	92.2°	7°38.9'	-17.8'	92.4°	7°36.4'	-18.8'	92.5°	7°33.7'	-19.8'	92.6°	7°30.9'	-20.8'	92.8°	0
1	7°30.9'	-14.8'	92.9°	7°27.8'	-15.9'	93.1°	7°24.5'	-16.9'	93.2°	7°21.1'	-17.9'	93.3°	7°17.6'	-18.9'	93.4°	7°13.9'	-19.9'	93.6°	7°10.1'	-20.9'	93.7°	1
2	7°16.0'	-15.0'	93.9°	7°11.9'	-16.0'	94.0°	7°07.7'	-17.0'	94.2°	7°03.2'	-18.0'	94.3°	6°58.7'	-19.0'	94.4°	6°54.0'	-20.0'	94.5°	6°49.2'	-21.0'	94.6°	2
3	7°01.1'	-15.1'	94.9°	6°56.0'	-16.1'	95.0°	6°50.7'	-17.1'	95.1°	6°45.2'	-18.1'	95.2°	6°39.7'	-19.1'	95.4°	6°34.0'	-20.1'	95.5°	6°28.3'	-21.1'	95.6°	3
4	6°46.0'	-15.2'	95.9°	6°39.8'	-16.2'	96.0°	6°33.5'	-17.2'	96.1°	6°27.1'	-18.2'	96.2°	6°20.6'	-19.2'	96.3°	6°13.9'	-20.2'	96.4°	6°07.2'	-21.2'	96.5°	4
5	6°30.8'	-15.3'	96.8°	6°23.6'	-16.3'	96.9°	6°16.3'	-17.3'	97.0°	6°08.9'	-18.3'	97.2°	6°01.4'	-19.3'	97.3°	5°53.7'	-20.3'	97.4°	5°46.0'	-21.3'	97.5°	5
6	6°15.5'	-15.4'	97.8°	6°07.3'	-16.4'	97.9°	5°59.0'	-17.4'	98.0°	5°50.6'	-18.4'	98.1°	5°42.1'	-19.4'	98.2°	5°33.4'	-20.4'	98.3°	5°24.7'	-21.4'	98.4°	6
7	6°00.1'	-15.5'	98.8°	5°50.9'	-16.5'	98.9°	5°41.6'	-17.5'	99.0°	5°32.2'	-18.5'	99.1°	5°22.6'	-19.5'	99.2°	5°13.0'	-20.5'	99.3°	5°03.3'	-21.4'	99.3°	7
8	5°44.5'	-15.6'	99.7°	5°34.3'	-16.6'	99.8°	5°24.0'	-17.6'	99.9°	5°13.6'	-18.6'	100.0°	5°03.1'	-19.6'	100.1°	4°52.6'	-20.6'	100.2°	4°41.9'	-21.5'	100.3°	8
9	5°28.9'	-15.7'	100.7°	5°17.7'	-16.7'	100.8°	5°06.4'	-17.7'	100.9°	4°55.0'	-18.7'	101.0°	4°43.6'	-19.7'	101.1°	4°32.0'	-20.6'	101.1°	4°20.4'	-21.6'	101.2°	9
10	5°13.2'	-15.8'	101.7°	5°01.0'	-16.8'	101.8°	4°48.7'	-17.8'	101.9°	4°36.3'	-18.8'	101.9°	4°23.9'	-19.7'	102.0°	4°11.4'	-20.7'	102.1°	3°58.8'	-21.7'	102.2°	10
11	4°57.4'	-15.9'	102.7°	4°44.2'	-16.9'	102.7°	4°30.9'	-17.9'	102.8°	4°17.6'	-18.8'	102.9°	4°04.2'	-19.8'	103.0°	3°50.7'	-20.8'	103.0°	3°37.1'	-21.7'	103.1°	11
12	4°41.5'	-16.0'	103.6°	4°27.3'	-17.0'	103.7°	4°13.1'	-17.9'	103.8°	3°58.8'	-18.9'	103.8°	3°44.4'	-19.9'	103.9°	3°29.9'	-20.8'	104.0°	3°15.4'	-21.8'	104.0°	12
13	4°25.5'	-16.1'	104.6°	4°10.4'	-17.0'	104.7°	3°55.1'	-18.0'	104.7°	3°39.9'	-19.0'	104.8°	3°24.5'	-19.9'	104.9°	3°09.1'	-20.9'	104.9°	2°53.6'	-21.8'	105.0°	13
14	4°09.5'	-16.1'	105.6°	3°53.3'	-17.1'	105.6°	3°37.2'	-18.1'	105.7°	3°20.9'	-19.0'	105.7°	3°04.6'	-20.0'	105.8°	2°48.2'	-20.9'	105.8°	2°31.8'	-21.9'	105.9°	14
15	3°53.3'	-16.2'	106.5°	3°36.2'	-17.2'	106.6°	3°19.1'	-18.1'	106.6°	3°01.9'	-19.1'	106.7°	2°44.6'	-20.0'	106.7°	2°27.3'	-20.9'	106.8°	2°10.0'	-21.9'	106.8°	15
16	3°37.2'	-16.2'	107.5°	3°19.1'	-17.2'	107.5°	3°01.0'	-18.2'	107.6°	2°42.8'	-19.1'	107.6°	2°24.6'	-20.0'	107.7°	2°06.4'	-21.0'	107.7°	1°48.1'	-21.9'	107.8°	16
17	3°20.9'	-16.3'	108.4°	3°01.9'	-17.3'	108.5°	2°42.8'	-18.2'	108.5°	2°23.7'	-19.1'	108.6°	2°04.6'	-20.1'	108.6°	1°45.4'	-21.0'	108.7°	1°26.2'	-21.9'	108.7°	17
18	3°04.6'	-16.4'	109.4°	2°44.6'	-17.3'	109.5°	2°24.6'	-18.2'	109.5°	2°04.6'	-19.2'	109.5°	1°44.5'	-20.1'	109.6°	1°24.4'	-21.0'	109.6°	1°04.3'	-22.0'	109.6°	18
19	2°48.2'	-16.4'	110.4°	2°27.3'	-17.3'	110.4°	2°06.4'	-18.3'	110.5°	1°45.4'	-19.2'	110.5°	1°24.4'	-20.1'	110.5°	1°03.4'	-21.1'	110.5°	0°42.3'	-22.0'	110.5°	19
20	2°31.8'	-16.4'	111.3°	2°10.0'	-17.4'	111.4°	1°48.1'	-18.3'	111.4°	1°26.2'	-19.2'	111.4°	1°04.3'	-20.2'	111.5°	0°42.3'	-21.1'	111.5°	<u>0°20.3'</u>	<u>-22.0'</u>	<u>111.5°</u>	20
21	2°15.4'	-16.5'	112.3°	1°52.6'	-17.4'	112.3°	1°29.8'	-18.3'	112.4°	1°07.0'	-19.3'	112.4°	0°44.1'	-20.2'	112.4°	0°21.2'	-21.1'	112.4°	0°01.6'	+22.0'	67.6°	21
22	1°58.9'	-16.5'	113.3°	1°35.2'	-17.4'	113.3°	1°11.5'	-18.4'	113.3°	0°47.7'	-19.3'	113.3°	0°23.9'	-20.2'	113.3°	<u>0°00.2'</u>	<u>-21.1'</u>	<u>113.3°</u>	0°23.6'	+22.0'	66.7°	22
23	<u>1°42.4'</u>	<u>-16.5'</u>	<u>114.2°</u>	<u>1°17.8'</u>	<u>-17.5'</u>	<u>114.2°</u>	<u>0°53.1'</u>	<u>-18.4'</u>	<u>114.3°</u>	<u>0°28.4'</u>	<u>-19.3'</u>	<u>114.3°</u>	<u>0°03.8'</u>	<u>-20.2'</u>	<u>114.3°</u>	<u>0°20.9'</u>	<u>+21.1'</u>	<u>65.7°</u>	0°45.6'	+22.0'	65.7°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

98° 262° LHA

Latitude SAME as DECLINATION

98° 262° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

81° 279° LHA

Latitude CONTRARY to Declination

81° 279° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	8°43.8'	-14.8'	92.2°	8°41.5'	-15.8'	92.3°	8°38.9'	-16.8'	92.5°	8°36.2'	-17.8'	92.7°	8°33.4'	-18.8'	92.8°	8°30.4'	-19.8'	93.0°	8°27.2'	-20.8'	93.1°	0
1	8°29.0'	-14.9'	93.2°	8°25.7'	-15.9'	93.3°	8°22.1'	-16.9'	93.5°	8°18.4'	-18.0'	93.6°	8°14.5'	-19.0'	93.8°	8°10.5'	-20.0'	93.9°	8°06.4'	-20.9'	94.0°	1
2	8°14.1'	-15.0'	94.2°	8°09.7'	-16.1'	94.3°	8°05.2'	-17.1'	94.4°	8°00.5'	-18.1'	94.6°	7°55.6'	-19.1'	94.7°	7°50.6'	-20.1'	94.9°	7°45.4'	-21.1'	95.0°	2
3	7°59.1'	-15.2'	95.1°	7°53.7'	-16.2'	95.3°	7°48.1'	-17.2'	95.4°	7°42.4'	-18.2'	95.5°	7°36.5'	-19.2'	95.7°	7°30.5'	-20.2'	95.8°	7°24.4'	-21.2'	95.9°	3
4	7°43.9'	-15.3'	96.1°	7°37.5'	-16.3'	96.2°	7°30.9'	-17.3'	96.4°	7°24.2'	-18.3'	96.5°	7°17.3'	-19.3'	96.6°	7°10.3'	-20.3'	96.8°	7°03.2'	-21.3'	96.9°	4
5	7°28.6'	-15.4'	97.1°	7°21.1'	-16.5'	97.2°	7°13.5'	-17.5'	97.3°	7°05.8'	-18.5'	97.5°	6°58.0'	-19.4'	97.6°	6°50.0'	-20.4'	97.7°	6°41.9'	-21.4'	97.8°	5
6	7°13.2'	-15.6'	98.1°	7°04.7'	-16.6'	98.2°	6°56.1'	-17.6'	98.3°	6°47.4'	-18.6'	98.4°	6°38.5'	-19.6'	98.5°	6°29.5'	-20.5'	98.7°	6°20.5'	-21.5'	98.8°	6
7	6°57.6'	-15.7'	99.0°	6°48.1'	-16.7'	99.2°	6°38.5'	-17.7'	99.3°	6°28.8'	-18.7'	99.4°	6°19.0'	-19.7'	99.5°	6°09.0'	-20.6'	99.6°	5°58.9'	-21.6'	99.7°	7
8	6°41.9'	-15.8'	100.0°	6°31.4'	-16.8'	100.1°	6°20.8'	-17.8'	100.2°	6°10.1'	-18.8'	100.3°	5°59.3'	-19.8'	100.4°	5°48.4'	-20.7'	100.5°	5°37.3'	-21.7'	100.6°	8
9	6°26.1'	-15.9'	101.0°	6°14.6'	-16.9'	101.1°	6°03.0'	-17.9'	101.2°	5°51.3'	-18.9'	101.3°	5°39.5'	-19.9'	101.4°	5°27.6'	-20.8'	101.5°	5°15.6'	-21.8'	101.6°	9
10	6°10.2'	-16.0'	101.9°	5°57.7'	-17.0'	102.0°	5°45.1'	-18.0'	102.1°	5°32.5'	-19.0'	102.2°	5°19.7'	-19.9'	102.3°	5°06.8'	-20.9'	102.4°	4°53.9'	-21.9'	102.5°	10
11	5°54.2'	-16.1'	102.9°	5°40.7'	-17.1'	103.0°	5°27.1'	-18.1'	103.1°	5°13.5'	-19.1'	103.2°	4°59.7'	-20.0'	103.3°	4°45.9'	-21.0'	103.4°	4°32.0'	-21.9'	103.4°	11
12	5°38.0'	-16.2'	103.9°	5°23.6'	-17.2'	104.0°	5°09.1'	-18.2'	104.1°	4°54.4'	-19.1'	104.1°	4°39.7'	-20.1'	104.2°	4°24.9'	-21.0'	104.3°	4°10.1'	-22.0'	104.4°	12
13	5°21.8'	-16.3'	104.8°	5°06.4'	-17.3'	104.9°	4°50.9'	-18.2'	105.0°	4°35.3'	-19.2'	105.1°	4°19.6'	-20.2'	105.2°	4°03.9'	-21.1'	105.2°	3°48.1'	-22.1'	105.3°	13
14	5°05.5'	-16.4'	105.8°	4°49.1'	-17.4'	105.9°	4°32.6'	-18.3'	106.0°	4°16.1'	-19.3'	106.1°	3°59.5'	-20.2'	106.1°	3°42.8'	-21.2'	106.2°	3°26.0'	-22.1'	106.2°	14
15	4°49.1'	-16.5'	106.8°	4°31.8'	-17.4'	106.9°	4°14.3'	-18.4'	106.9°	3°56.8'	-19.3'	107.0°	3°39.2'	-20.3'	107.1°	3°21.6'	-21.2'	107.1°	3°03.9'	-22.2'	107.2°	15
16	4°32.6'	-16.6'	107.7°	4°14.3'	-17.5'	107.8°	3°55.9'	-18.5'	107.9°	3°37.5'	-19.4'	107.9°	3°18.9'	-20.3'	108.0°	3°00.4'	-21.3'	108.1°	2°41.7'	-22.2'	108.1°	16
17	4°16.1'	-16.6'	108.7°	3°56.8'	-17.6'	108.8°	3°37.5'	-18.5'	108.8°	3°18.1'	-19.5'	108.9°	2°58.6'	-20.4'	108.9°	2°39.1'	-21.3'	109.0°	2°19.5'	-22.2'	109.0°	17
18	3°59.5'	-16.7'	109.7°	3°39.2'	-17.6'	109.7°	3°18.9'	-18.6'	109.8°	2°58.6'	-19.5'	109.8°	2°38.2'	-20.4'	109.9°	2°17.8'	-21.4'	109.9°	1°57.3'	-22.3'	110.0°	18
19	3°42.8'	-16.8'	110.6°	3°21.6'	-17.7'	110.7°	3°00.4'	-18.6'	110.7°	2°39.1'	-19.6'	110.8°	2°17.8'	-20.5'	110.8°	1°56.4'	-21.4'	110.9°	1°35.0'	-22.3'	110.9°	19
20	3°26.0'	-16.8'	111.6°	3°03.9'	-17.7'	111.7°	2°41.7'	-18.7'	111.7°	2°19.5'	-19.6'	111.7°	1°57.3'	-20.5'	111.8°	1°35.0'	-21.4'	111.8°	1°12.7'	-22.3'	111.8°	20
21	3°09.2'	-16.9'	112.6°	2°46.2'	-17.8'	112.6°	2°23.1'	-18.7'	112.6°	1°60.0'	-19.6'	112.7°	1°36.8'	-20.5'	112.7°	1°13.6'	-21.4'	112.7°	0°50.4'	-22.3'	112.8°	21
22	2°52.3'	-16.9'																				

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

80° 280° LHA

Latitude CONTRARY to Declination

80° 280° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	9°42.0'	-14.8'	92.4°	9°39.4'	-15.8'	92.6°	9°36.5'	-16.9'	92.8°	9°33.5'	-17.9'	93.0°	9°30.4'	-18.9'	93.1°	9°27.0'	-19.9'	93.3°	9°23.5'	-20.9'	93.5°	0
1	9°27.1'	-15.0'	93.4°	9°23.5'	-16.0'	93.6°	9°19.7'	-17.0'	93.8°	9°15.7'	-18.0'	93.9°	9°11.5'	-19.0'	94.1°	9°07.1'	-20.0'	94.2°	9°02.6'	-21.0'	94.4°	1
2	9°12.2'	-15.1'	94.4°	9°07.5'	-16.2'	94.6°	9°02.7'	-17.2'	94.7°	8°57.6'	-18.2'	94.9°	8°52.4'	-19.2'	95.0°	8°47.1'	-20.2'	95.2°	8°41.6'	-21.2'	95.3°	2
3	8°57.1'	-15.3'	95.4°	8°51.4'	-16.3'	95.5°	8°45.5'	-17.3'	95.7°	8°39.5'	-18.3'	95.8°	8°33.3'	-19.3'	96.0°	8°26.9'	-20.3'	96.1°	8°20.4'	-21.3'	96.3°	3
4	8°41.8'	-15.4'	96.4°	8°35.1'	-16.4'	96.5°	8°28.2'	-17.5'	96.7°	8°21.1'	-18.5'	96.8°	8°14.0'	-19.5'	97.0°	8°06.6'	-20.4'	97.1°	7°59.1'	-21.4'	97.2°	4
5	8°26.4'	-15.6'	97.3°	8°18.6'	-16.6'	97.5°	8°10.7'	-17.6'	97.6°	8°02.7'	-18.6'	97.8°	7°54.5'	-19.6'	97.9°	7°46.2'	-20.6'	98.0°	7°37.7'	-21.5'	98.2°	5
6	8°10.8'	-15.7'	98.3°	8°02.0'	-16.7'	98.5°	7°53.1'	-17.7'	98.6°	7°44.1'	-18.7'	98.7°	7°34.9'	-19.7'	98.9°	7°25.6'	-20.7'	99.0°	7°16.2'	-21.7'	99.1°	6
7	7°55.1'	-15.9'	99.3°	7°45.3'	-16.9'	99.4°	7°35.4'	-17.9'	99.6°	7°25.4'	-18.8'	99.7°	7°15.2'	-19.8'	99.8°	7°04.9'	-20.8'	99.9°	6°54.5'	-21.8'	100.1°	7
8	7°39.2'	-16.0'	100.3°	7°28.4'	-17.0'	100.4°	7°17.6'	-18.0'	100.5°	7°06.5'	-19.0'	100.6°	6°55.4'	-19.9'	100.8°	6°44.1'	-20.9'	100.9°	6°32.7'	-21.9'	101.0°	8
9	7°23.2'	-16.1'	101.2°	7°11.5'	-17.1'	101.4°	6°59.6'	-18.1'	101.5°	6°47.6'	-19.1'	101.6°	6°35.4'	-20.0'	101.7°	6°23.2'	-21.0'	101.8°	6°10.8'	-22.0'	101.9°	9
10	7°07.1'	-16.2'	102.2°	6°54.4'	-17.2'	102.3°	6°41.5'	-18.2'	102.4°	6°28.5'	-19.2'	102.6°	6°15.4'	-20.1'	102.7°	6°02.2'	-21.1'	102.8°	5°48.9'	-22.1'	102.9°	10
11	6°50.9'	-16.4'	103.2°	6°37.1'	-17.3'	103.3°	6°23.3'	-18.3'	103.4°	6°09.3'	-19.3'	103.5°	5°55.2'	-20.2'	103.6°	5°41.1'	-21.2'	103.7°	5°26.8'	-22.2'	103.8°	11
12	6°34.5'	-16.5'	104.1°	6°19.8'	-17.4'	104.3°	6°05.0'	-18.4'	104.4°	5°50.0'	-19.4'	104.5°	5°35.0'	-20.3'	104.6°	5°19.9'	-21.3'	104.7°	5°04.6'	-22.2'	104.7°	12
13	6°18.1'	-16.6'	105.1°	6°02.4'	-17.5'	105.2°	5°46.6'	-18.5'	105.3°	5°30.7'	-19.5'	105.4°	5°14.7'	-20.4'	105.5°	4°58.6'	-21.4'	105.6°	4°42.4'	-22.3'	105.7°	13
14	6°01.5'	-16.7'	106.1°	5°44.8'	-17.6'	106.2°	5°28.0'	-18.6'	106.3°	5°11.2'	-19.6'	106.4°	4°54.2'	-20.5'	106.5°	4°37.2'	-21.4'	106.5°	4°20.1'	-22.4'	106.6°	14
15	5°44.8'	-16.8'	107.0°	5°27.2'	-17.7'	107.1°	5°09.4'	-18.7'	107.2°	4°51.6'	-19.6'	107.3°	4°33.7'	-20.6'	107.4°	4°15.8'	-21.5'	107.5°	3°57.7'	-22.4'	107.5°	15
16	5°28.0'	-16.9'	108.0°	5°09.4'	-17.8'	108.1°	4°50.8'	-18.8'	108.2°	4°32.0'	-19.7'	108.3°	4°13.2'	-20.6'	108.3°	3°54.3'	-21.6'	108.4°	3°35.3'	-22.5'	108.5°	16
17	5°11.2'	-16.9'	109.0°	4°51.6'	-17.9'	109.1°	4°32.0'	-18.8'	109.1°	4°12.3'	-19.8'	109.2°	3°52.5'	-20.7'	109.3°	3°32.7'	-21.6'	109.3°	3°12.8'	-22.5'	109.4°	17
18	4°54.2'	-17.0'	109.9°	4°33.7'	-18.0'	110.0°	4°13.2'	-18.9'	110.1°	3°52.5'	-19.8'	110.2°	3°31.8'	-20.8'	110.2°	3°11.0'	-21.7'	110.3°	2°50.2'	-22.6'	110.3°	18
19	4°37.2'	-17.1'	110.9°	4°15.8'	-18.0'	111.0°	3°54.3'	-19.0'	111.0°	3°32.7'	-19.9'	111.1°	3°11.0'	-20.8'	111.2°	2°49.4'	-21.7'	111.2°	2°27.6'	-22.6'	111.2°	19
20	4°20.1'	-17.2'	111.9°	3°57.7'	-18.1'	111.9°	3°35.3'	-19.0'	112.0°	3°12.8'	-19.9'	112.0°	2°50.2'	-20.9'	112.1°	2°27.6'	-21.8'	112.1°	2°05.0'	-22.7'	112.2°	20
21	4°02.9'	-17.3'	112.8°	3°39.6'	-18.2'	112.9°	3°16.2'	-19.1'	112.9°	2°52.8'	-20.0'	113.0°	2°29.4'	-20.9'	113.0°	2°05.9'	-21.8'	113.1°	1°42.4'	-22.7'	113.1°	21
22	3°45.7'	-17.3'	113.8°	3°21.4'	-18.2'	113.8°	2°57.2'	-19.1'	113.9°	2°32.8'	-20.0'	113.9°	2°08.5'	-20.9'	114.0°	1°44.1'	-21.8'	114.0°	1°19.7'	-22.7'	114.0°	22
23	3°28.4'	-17.4'	114.7°	3°03.2'	-18.3'	114.8°	2°38.0'	-19.2'	114.8°	2°12.8'	-20.1'	114.9°	1°47.5'	-21.0'	114.9°	1°22.3'	-21.8'	114.9°	0°57.0'	-22.7'	115.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

80° 280° LHA

Latitude CONTRARY to DECLINATION

80° 280° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

79° 281° LHA

Latitude CONTRARY to Declination

79° 281° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	10°40.1'	-14.9'	92.7°	10°37.2'	-15.9'	92.9°	10°34.1'	-16.9'	93.1°	10°30.8'	-17.9'	93.3°	10°27.3'	-18.9'	93.4°	10°23.6'	-19.9'	93.6°	10°19.7'	-20.9'	93.8°	0
1	10°25.2'	-15.0'	93.7°	10°21.4'	-16.1'	93.9°	10°17.2'	-17.1'	94.0°	10°12.9'	-18.1'	94.2°	10°08.4'	-19.1'	94.4°	10°03.7'	-20.1'	94.6°	9°58.8'	-21.1'	94.8°	1
2	10°10.2'	-15.2'	94.7°	10°05.3'	-16.2'	94.8°	10°00.1'	-17.3'	95.0°	9°54.8'	-18.3'	95.2°	9°49.3'	-19.3'	95.4°	9°43.6'	-20.3'	95.5°	9°37.7'	-21.3'	95.7°	2
3	9°55.0'	-15.4'	95.6°	9°49.0'	-16.4'	95.8°	9°42.9'	-17.4'	96.0°	9°36.5'	-18.4'	96.2°	9°30.0'	-19.4'	96.3°	9°23.3'	-20.4'	96.5°	9°16.4'	-21.4'	96.7°	3
4	9°39.6'	-15.6'	96.6°	9°32.6'	-16.6'	96.8°	9°25.5'	-17.6'	97.0°	9°18.1'	-18.6'	97.1°	9°10.6'	-19.6'	97.3°	9°02.9'	-20.6'	97.4°	8°55.0'	-21.6'	97.6°	4
5	9°24.1'	-15.7'	97.6°	9°16.1'	-16.7'	97.8°	9°07.9'	-17.7'	97.9°	8°59.5'	-18.7'	98.1°	8°51.0'	-19.7'	98.2°	8°42.3'	-20.7'	98.4°	8°33.5'	-21.7'	98.5°	5
6	9°08.4'	-15.9'	98.6°	8°59.3'	-16.9'	98.7°	8°50.1'	-17.9'	98.9°	8°40.8'	-18.9'	99.0°	8°31.3'	-19.9'	99.2°	8°21.6'	-20.8'	99.3°	8°11.8'	-21.8'	99.5°	6
7	8°52.5'	-16.0'	99.6°	8°42.5'	-17.0'	99.7°	8°32.3'	-18.0'	99.9°	8°21.9'	-19.0'	100.0°	8°11.4'	-20.0'	100.1°	8°00.8'	-21.0'	100.3°	7°50.0'	-21.9'	100.4°	7
8	8°36.5'	-16.2'	100.5°	8°25.4'	-17.2'	100.7°	8°14.2'	-18.2'	100.8°	8°02.9'	-19.1'	101.0°	7°51.4'	-20.1'	101.1°	7°39.8'	-21.1'	101.2°	7°28.0'	-22.1'	101.4°	8
9	8°20.3'	-16.3'	101.5°	8°08.3'	-17.3'	101.6°	7°56.1'	-18.3'	101.8°	7°43.7'	-19.3'	101.9°	7°31.3'	-20.3'	102.1°	7°18.7'	-21.2'	102.2°	7°06.0'	-22.2'	102.3°	9
10	8°04.0'	-16.5'	102.5°	7°50.9'	-17.4'	102.6°	7°37.8'	-18.4'	102.7°	7°24.5'	-19.4'	102.9°	7°11.0'	-20.4'	103.0°	6°57.5'	-21.3'	103.1°	6°43.8'	-22.3'	103.2°	10
11	7°47.5'	-16.6'	103.5°	7°33.5'	-17.6'	103.6°	7°19.3'	-18.5'	103.7°	7°05.1'	-19.5'	103.8°	6°50.7'	-20.5'	103.9°	6°36.1'	-21.4'	104.1°	6°21.5'	-22.4'	104.2°	11
12	7°30.9'	-16.7'	104.4°	7°15.9'	-17.7'	104.5°	7°00.8'	-18.7'	104.7°	6°45.6'	-19.6'	104.8°	6°30.2'	-20.6'	104.9°	6°14.7'	-21.5'	105.0°	5°59.1'	-22.5'	105.1°	12
13	7°14.2'	-16.8'	105.4°	6°58.2'	-17.8'	105.5°	6°42.1'	-18.8'	105.6°	6°25.9'	-19.7'	105.7°	6°09.6'	-20.7'	105.8°	5°53.2'	-21.6'	105.9°	5°36.6'	-22.6'	106.0°	13
14	6°57.4'	-17.0'	106.4°	6°40.4'	-17.9'	106.5°	6°23.4'	-18.9'	106.6°	6°06.2'	-19.8'	106.7°	5°48.9'	-20.8'	106.8°	5°31.5'	-21.7'	106.9°	5°14.1'	-22.6'	107.0°	14
15	6°40.4'	-17.1'	107.3°	6°22.5'	-18.0'	107.4°	6°04.5'	-19.0'	107.5°	5°46.4'	-19.9'	107.6°	5°28.1'	-20.9'	107.7°	5°09.8'	-21.8'	107.8°	4°51.4'	-22.7'	107.9°	15
16	6°23.4'	-17.2'	108.3°	6°04.5'	-18.1'	108.4°	5°45.5'	-19.1'	108.5°	5°26.4'	-20.0'	108.6°	5°07.3'	-20.9'	108.7°	4°48.0'	-21.9'	108.8°	4°28.7'	-22.8'	108.8°	16
17	6°06.2'	-17.3'	109.3°	5°46.4'	-18.2'	109.3°	5°26.4'	-19.2'	109.4°	5°06.4'	-20.1'	109.5°	4°46.3'	-21.0'	109.6°	4°26.2'	-21.9'	109.7°	4°05.9'	-22.9'	109.8°	17
18	5°48.9'	-17.4'	110.2°	5°28.1'	-18.3'	110.3°	5°07.3'	-19.2'	110.4°	4°46.3'	-20.2'	110.5°	4°25.3'	-21.1'	110.5°	4°04.2'	-22.0'	110.6°	3°43.0'	-22.9'	110.7°	18
19	5°31.5'	-17.5'	111.2°	5°09.8'	-18.4'	111.3°	4°48.0'	-19.3'	111.3°	4°26.2'	-20.2'	111.4°	4°04.2'	-21.2'	111.5°	3°42.2'	-22.1'	111.6°	3°20.1'	-23.0'	111.6°	19
20	5°14.1'	-17.6'	112.1°	4°51.4'	-18.5'	112.2°	4°28.7'	-19.4'	112.3°	4°05.9'	-20.3'	112.4°	3°43.0'	-21.2'	112.4°	3°20.1'	-22.1'	112.5°	2°57.2'	-23.0'	112.5°	20
21	4°56.5'	-17.6'	113.1°	4°32.9'	-18.6'	113.2°	4°09.3'	-19.5'	113.2°	3°45.6'	-20.4'	113.3°	3°21.8'	-21.3'	113.4°	2°58.0'	-22.2'	113.4°	2°34.1'	-23.1'	113.5°	21
22	4°38.9'	-17.7'	114.1°	4°14.4'	-18.6'	114.1°	3°49.8'	-19.5'	114.2													

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

78° 282° LHA

Latitude CONTRARY to Declination

78° 282° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	11°38.3'	-14.9'	92.9°	11°35.1'	-16.0'	93.1°	11°31.7'	-17.0'	93.4°	11°28.1'	-18.0'	93.6°	11°24.3'	-19.0'	93.8°	11°20.2'	-20.0'	94.0°	11°16.0'	-21.0'	94.2°	0
1	11°23.3'	-15.1'	93.9°	11°19.2'	-16.1'	94.1°	11°14.7'	-17.2'	94.3°	11°10.1'	-18.2'	94.5°	11°05.3'	-19.2'	94.7°	11°00.2'	-20.2'	94.9°	10°55.0'	-21.2'	95.1°	1
2	11°08.2'	-15.3'	94.9°	11°03.0'	-16.3'	95.1°	10°57.6'	-17.4'	95.3°	10°51.9'	-18.4'	95.5°	10°46.1'	-19.4'	95.7°	10°40.0'	-20.4'	95.9°	10°33.8'	-21.4'	96.1°	2
3	10°53.0'	-15.5'	95.9°	10°46.7'	-16.5'	96.1°	10°40.2'	-17.5'	96.3°	10°33.6'	-18.5'	96.5°	10°26.7'	-19.5'	96.7°	10°19.7'	-20.5'	96.8°	10°12.4'	-21.5'	97.0°	3
4	10°37.5'	-15.7'	96.9°	10°30.2'	-16.7'	97.1°	10°22.7'	-17.7'	97.3°	10°15.0'	-18.7'	97.4°	10°07.2'	-19.7'	97.6°	9°59.1'	-20.7'	97.8°	9°50.9'	-21.7'	98.0°	4
5	10°21.8'	-15.9'	97.9°	10°13.5'	-16.9'	98.0°	10°05.0'	-17.9'	98.2°	9°56.3'	-18.9'	98.4°	9°47.4'	-19.9'	98.6°	9°38.4'	-20.9'	98.7°	9°29.2'	-21.8'	98.9°	5
6	10°05.9'	-16.0'	98.8°	9°56.6'	-17.0'	99.0°	9°47.1'	-18.0'	99.2°	9°37.4'	-19.0'	99.4°	9°27.6'	-20.0'	99.5°	9°17.6'	-21.0'	99.7°	9°07.4'	-22.0'	99.9°	6
7	9°49.9'	-16.2'	99.8°	9°39.6'	-17.2'	100.0°	9°29.1'	-18.2'	100.2°	9°18.4'	-19.2'	100.3°	9°07.5'	-20.2'	100.5°	8°56.5'	-21.2'	100.6°	8°45.4'	-22.1'	100.8°	7
8	9°33.7'	-16.4'	100.8°	9°22.3'	-17.4'	101.0°	9°10.9'	-18.4'	101.1°	8°59.2'	-19.3'	101.3°	8°47.4'	-20.3'	101.4°	8°35.4'	-21.3'	101.6°	8°23.3'	-22.3'	101.7°	8
9	9°17.3'	-16.5'	101.8°	9°05.0'	-17.5'	101.9°	8°52.5'	-18.5'	102.1°	8°39.8'	-19.5'	102.2°	8°27.0'	-20.5'	102.4°	8°14.1'	-21.4'	102.5°	8°01.0'	-22.4'	102.7°	9
10	9°00.8'	-16.7'	102.8°	8°47.5'	-17.7'	102.9°	8°34.0'	-18.6'	103.1°	8°20.4'	-19.6'	103.2°	8°06.6'	-20.6'	103.3°	7°52.7'	-21.6'	103.5°	7°38.6'	-22.5'	103.6°	10
11	8°44.1'	-16.8'	103.7°	8°29.8'	-17.8'	103.9°	8°15.3'	-18.8'	104.0°	8°00.7'	-19.8'	104.2°	7°46.0'	-20.7'	104.3°	7°31.1'	-21.7'	104.4°	7°16.1'	-22.6'	104.5°	11
12	8°27.3'	-17.0'	104.7°	8°12.0'	-17.9'	104.8°	7°56.6'	-18.9'	105.0°	7°41.0'	-19.9'	105.1°	7°25.3'	-20.8'	105.2°	7°09.5'	-21.8'	105.4°	6°53.5'	-22.7'	105.5°	12
13	8°10.3'	-17.1'	105.7°	7°54.0'	-18.1'	105.8°	7°37.6'	-19.0'	105.9°	7°21.1'	-20.0'	106.1°	7°04.5'	-20.9'	106.2°	6°47.7'	-21.9'	106.3°	6°30.8'	-22.8'	106.4°	13
14	7°53.2'	-17.2'	106.6°	7°36.0'	-18.2'	106.8°	7°18.6'	-19.2'	106.9°	7°01.1'	-20.1'	107.0°	6°43.5'	-21.1'	107.1°	6°25.8'	-22.0'	107.2°	6°07.9'	-22.9'	107.3°	14
15	7°36.0'	-17.4'	107.6°	7°17.8'	-18.3'	107.7°	6°59.4'	-19.3'	107.8°	6°41.0'	-20.2'	108.0°	6°22.4'	-21.2'	108.1°	6°03.8'	-22.1'	108.2°	5°45.0'	-23.0'	108.3°	15
16	7°18.6'	-17.5'	108.6°	6°59.4'	-18.4'	108.7°	6°40.2'	-19.4'	108.8°	6°20.8'	-20.3'	108.9°	6°01.3'	-21.3'	109.0°	5°41.7'	-22.2'	109.1°	5°22.0'	-23.1'	109.2°	16
17	7°01.1'	-17.6'	109.5°	6°41.0'	-18.6'	109.6°	6°20.8'	-19.5'	109.8°	6°00.4'	-20.4'	109.9°	5°40.0'	-21.3'	109.9°	5°19.5'	-22.3'	110.0°	4°58.9'	-23.2'	110.1°	17
18	6°43.5'	-17.7'	110.5°	6°22.4'	-18.7'	110.6°	6°01.3'	-19.6'	110.7°	5°40.0'	-20.5'	110.8°	5°18.7'	-21.4'	110.9°	4°57.2'	-22.3'	111.0°	4°35.7'	-23.2'	111.0°	18
19	6°25.8'	-17.8'	111.5°	6°03.8'	-18.8'	111.6°	5°41.7'	-19.7'	111.7°	5°19.5'	-20.6'	111.7°	4°57.2'	-21.5'	111.8°	4°34.9'	-22.4'	111.9°	4°12.5'	-23.3'	112.0°	19
20	6°07.9'	-17.9'	112.4°	5°45.0'	-18.9'	112.5°	5°22.0'	-19.8'	112.6°	4°58.9'	-20.7'	112.7°	4°35.7'	-21.6'	112.8°	4°12.5'	-22.5'	112.8°	3°49.2'	-23.4'	112.9°	20
21	5°50.0'	-18.0'	113.4°	5°26.2'	-18.9'	113.5°	5°02.2'	-19.9'	113.5°	4°38.2'	-20.8'	113.6°	4°14.1'	-21.7'	113.7°	3°50.0'	-22.5'	113.8°	3°25.8'	-23.4'	113.8°	21
22	5°32.0'	-18.1'	114.3°	5°07.2'	-19.0'	114.4°	4°42.4'	-19.9'	114.5°	4°17.5'	-20.8'	114.6°	3°52.5'	-21.7'	114.6°	3°27.5'	-22.6'	114.7°	3°02.4'	-23.5'	114.7°	22
23	5°13.9'	-18.2'	115.3°	4°48.2'	-19.1'	115.4°	4°22.5'	-20.0'	115.4°	3°56.6'	-20.9'	115.5°	3°30.8'	-21.8'	115.6°	3°04.9'	-22.6'	115.6°	2°38.9'	-23.5'	115.7°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

78° 282° LHA

Latitude CONTRARY to DECLINATION

78° 282° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

77° 283° LHA

Latitude CONTRARY to Declination

77° 283° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	12°36.4'	-15.0'	93.2°	12°33.0'	-16.0'	93.4°	12°29.3'	-17.0'	93.6°	12°25.4'	-18.1'	93.9°	12°21.2'	-19.1'	94.1°	12°16.8'	-20.1'	94.3°	12°12.2'	-21.1'	94.5°	0
1	12°21.4'	-15.2'	94.2°	12°17.0'	-16.2'	94.4°	12°12.2'	-17.3'	94.6°	12°07.3'	-18.3'	94.8°	12°02.1'	-19.3'	95.1°	11°56.7'	-20.3'	95.3°	11°51.1'	-21.3'	95.5°	1
2	12°06.2'	-15.4'	95.2°	12°00.7'	-16.4'	95.4°	11°55.0'	-17.5'	95.6°	11°49.0'	-18.5'	95.8°	11°42.8'	-19.5'	96.0°	11°36.4'	-20.5'	96.2°	11°29.8'	-21.5'	96.4°	2
3	11°50.9'	-15.6'	96.2°	11°44.3'	-16.6'	96.4°	11°37.5'	-17.7'	96.6°	11°30.6'	-18.7'	96.8°	11°23.4'	-19.7'	97.0°	11°16.0'	-20.7'	97.2°	11°08.4'	-21.7'	97.4°	3
4	11°35.2'	-15.8'	97.2°	11°27.7'	-16.8'	97.4°	11°19.9'	-17.8'	97.6°	11°11.9'	-18.8'	97.8°	11°03.7'	-19.8'	97.9°	10°55.3'	-20.8'	98.1°	10°46.7'	-21.8'	98.3°	4
5	11°19.4'	-16.0'	98.1°	11°10.8'	-17.0'	98.3°	11°02.0'	-18.0'	98.5°	10°53.0'	-19.0'	98.7°	10°43.8'	-20.0'	98.9°	10°34.5'	-21.0'	99.1°	10°24.9'	-22.0'	99.3°	5
6	11°03.4'	-16.2'	99.1°	10°53.8'	-17.2'	99.3°	10°44.0'	-18.2'	99.5°	10°34.0'	-19.2'	99.7°	10°23.8'	-20.2'	99.9°	10°13.4'	-21.2'	100.0°	10°02.9'	-22.2'	100.2°	6
7	10°47.2'	-16.4'	100.1°	10°36.6'	-17.4'	100.3°	10°25.8'	-18.4'	100.5°	10°14.8'	-19.4'	100.6°	10°03.6'	-20.4'	100.8°	9°52.3'	-21.3'	101.0°	9°40.7'	-22.3'	101.2°	7
8	10°30.8'	-16.6'	101.1°	10°19.2'	-17.6'	101.3°	10°07.4'	-18.6'	101.4°	9°55.4'	-19.5'	101.6°	9°43.3'	-20.5'	101.8°	9°30.9'	-21.5'	101.9°	9°18.4'	-22.5'	102.1°	8
9	10°14.3'	-16.7'	102.1°	10°01.7'	-17.7'	102.2°	9°48.9'	-18.7'	102.4°	9°35.9'	-19.7'	102.6°	9°22.7'	-20.7'	102.7°	9°09.4'	-21.6'	102.9°	8°56.0'	-22.6'	103.0°	9
10	9°57.5'	-16.9'	103.0°	9°43.9'	-17.9'	103.2°	9°30.1'	-18.9'	103.4°	9°16.2'	-19.9'	103.5°	9°02.1'	-20.8'	103.7°	8°47.8'	-21.8'	103.8°	8°33.4'	-22.7'	104.0°	10
11	9°40.6'	-17.1'	104.0°	9°26.0'	-18.1'	104.2°	9°11.3'	-19.0'	104.3°	8°56.3'	-20.0'	104.5°	8°41.3'	-21.0'	104.6°	8°26.0'	-21.9'	104.8°	8°10.7'	-22.9'	104.9°	11
12	9°23.6'	-17.2'	105.0°	9°08.0'	-18.2'	105.1°	8°52.2'	-19.2'	105.3°	8°36.3'	-20.1'	105.4°	8°20.3'	-21.1'	105.6°	8°04.1'	-22.0'	105.7°	7°47.8'	-23.0'	105.9°	12
13	9°06.3'	-17.4'	105.9°	8°49.8'	-18.4'	106.1°	8°33.1'	-19.3'	106.2°	8°16.2'	-20.3'	106.4°	7°59.2'	-21.2'	106.5°	7°42.1'	-22.2'	106.7°	7°24.8'	-23.1'	106.8°	13
14	8°49.0'	-17.5'	106.9°	8°31.4'	-18.5'	107.1°	8°13.7'	-19.5'	107.2°	7°55.9'	-20.4'	107.3°	7°38.0'	-21.3'	107.5°	7°19.9'	-22.3'	107.6°	7°01.7'	-23.2'	107.7°	14
15	8°31.4'	-17.7'	107.9°	8°12.9'	-18.6'	108.0°	7°54.3'	-19.6'	108.2°	7°35.5'	-20.5'	108.3°	7°16.6'	-21.5'	108.4°	6°57.6'	-22.4'	108.5°	6°38.5'	-23.3'	108.6°	15
16	8°13.7'	-17.8'	108.8°	7°54.3'	-18.8'	109.0°	7°34.7'	-19.7'	109.1°	7°15.0'	-20.6'	109.2°	6°55.2'	-21.6'	109.4°	6°35.2'	-22.5'	109.5°	6°15.2'	-23.4'	109.6°	16
17	7°55.9'	-17.9'	109.8°	7°35.5'	-18.9'	109.9°	7°15.0'	-19.8'	110.1°	6°54.4'	-20.8'	110.2°	6°33.6'	-21.7'	110.3°	6°12.7'	-22.6'	110.4°	5°51.8'	-23.5'	110.5°	17
18	7°38.0'	-18.1'	110.8°	7°16.6'	-19.0'	110.9°	6°55.2'	-19.9'	111.0°	6°33.6'	-20.9'	111.1°	6°11.9'	-21.8'	111.2°	5°50.2'	-22.7'	111.3°	5°28.3'	-23.6'	111.4°	18
19	7°19.9'	-18.2'	111.7°	6°57.6'	-19.1'	111.9°	6°35.2'	-20.0'	112.0°	6°12.7'	-21.0'	112.1°	5°50.2'	-21.9'	112.2°	5°27.5'	-22.8'	112.3°	5°04.7'	-23.7'	112.3°	19
20	7°01.7'	-18.3'	112.7°	6°38.5'	-19.2'	112.8°	6°15.2'	-20.1'	112.9°	5°51.8'	-21.1'	113.0°	5°28.3'	-22.0'	113.1°	5°04.7'	-22.8'	113.2°	4°41.0'	-23.7'	113.3°	20
21	6°43.4'	-18.4'	113.7°	6°19.3'	-19.3'	113.8°	5°55.0'	-20.2'	113.9°	5°30.7'	-21.1'	114.0°	5°06.3'	-22.0'	114.0°	4°41.9'	-22.9'	114.1°	4°17.3'	-23.8'	114.2°	21
22																						

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

76° 284° LHA

Latitude CONTRARY to Declination

76° 284° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	13°34.5'	-15.1'	93.5°	13°30.8'	-16.1'	93.7°	13°26.8'	-17.1'	93.9°	13°22.6'	-18.1'	94.2°	13°18.1'	-19.2'	94.4°	13°13.4'	-20.2'	94.6°	13°08.4'	-21.2'	94.9°	0
1	13°19.5'	-15.3'	94.4°	13°14.7'	-16.3'	94.7°	13°09.7'	-17.3'	94.9°	13°04.5'	-18.4'	95.1°	12°58.9'	-19.4'	95.4°	12°53.2'	-20.4'	95.6°	12°47.2'	-21.4'	95.8°	1
2	13°04.2'	-15.5'	95.4°	12°58.4'	-16.5'	95.7°	12°52.4'	-17.6'	95.9°	12°46.1'	-18.6'	96.1°	12°39.6'	-19.6'	96.3°	12°32.8'	-20.6'	96.6°	12°25.8'	-21.6'	96.8°	2
3	12°48.7'	-15.7'	96.4°	12°41.9'	-16.8'	96.7°	12°34.8'	-17.8'	96.9°	12°27.5'	-18.8'	97.1°	12°20.0'	-19.8'	97.3°	12°12.2'	-20.8'	97.5°	12°04.2'	-21.8'	97.7°	3
4	12°33.0'	-15.9'	97.4°	12°25.1'	-17.0'	97.6°	12°17.0'	-18.0'	97.9°	12°08.7'	-19.0'	98.1°	12°00.2'	-20.0'	98.3°	11°51.4'	-21.0'	98.5°	11°42.5'	-22.0'	98.7°	4
5	12°17.0'	-16.2'	98.4°	12°08.2'	-17.2'	98.6°	11°59.1'	-18.2'	98.8°	11°49.7'	-19.2'	99.0°	11°40.2'	-20.2'	99.2°	11°30.4'	-21.2'	99.4°	11°20.5'	-22.2'	99.6°	5
6	12°00.9'	-16.4'	99.4°	11°51.0'	-17.4'	99.6°	11°40.9'	-18.4'	99.8°	11°30.5'	-19.4'	100.0°	11°20.0'	-20.4'	100.2°	11°09.3'	-21.4'	100.4°	10°58.3'	-22.3'	100.6°	6
7	11°44.5'	-16.6'	100.4°	11°33.6'	-17.6'	100.6°	11°22.5'	-18.6'	100.8°	11°11.2'	-19.6'	101.0°	10°59.6'	-20.5'	101.2°	10°47.9'	-21.5'	101.4°	10°36.0'	-22.5'	101.5°	7
8	11°27.9'	-16.8'	101.4°	11°16.0'	-17.8'	101.6°	11°03.9'	-18.8'	101.7°	10°51.6'	-19.7'	101.9°	10°39.1'	-20.7'	102.1°	10°26.4'	-21.7'	102.3°	10°13.5'	-22.7'	102.5°	8
9	11°11.2'	-17.0'	102.3°	10°58.3'	-17.9'	102.5°	10°45.2'	-18.9'	102.7°	10°31.9'	-19.9'	102.9°	10°18.4'	-20.9'	103.1°	10°04.7'	-21.9'	103.3°	9°50.9'	-22.8'	103.4°	9
10	10°54.2'	-17.1'	103.3°	10°40.3'	-18.1'	103.5°	10°26.2'	-19.1'	103.7°	10°11.9'	-20.1'	103.9°	9°57.5'	-21.1'	104.0°	9°42.8'	-22.0'	104.2°	9°28.0'	-23.0'	104.4°	10
11	10°37.1'	-17.3'	104.3°	10°22.2'	-18.3'	104.5°	10°07.1'	-19.3'	104.6°	9°51.9'	-20.2'	104.8°	9°36.4'	-21.2'	105.0°	9°20.8'	-22.2'	105.1°	9°05.1'	-23.1'	105.3°	11
12	10°19.8'	-17.5'	105.3°	10°03.9'	-18.5'	105.4°	9°47.8'	-19.4'	105.6°	9°31.6'	-20.4'	105.8°	9°15.2'	-21.4'	105.9°	8°58.7'	-22.3'	106.1°	8°42.0'	-23.2'	106.2°	12
13	10°02.3'	-17.7'	106.2°	9°45.4'	-18.6'	106.4°	9°28.4'	-19.6'	106.6°	9°11.2'	-20.6'	106.7°	8°53.9'	-21.5'	106.9°	8°36.4'	-22.4'	107.0°	8°18.7'	-23.4'	107.2°	13
14	9°44.6'	-17.8'	107.2°	9°26.8'	-18.8'	107.4°	9°08.8'	-19.7'	107.5°	8°50.7'	-20.7'	107.7°	8°32.4'	-21.6'	107.8°	8°13.9'	-22.6'	108.0°	7°55.4'	-23.5'	108.1°	14
15	9°26.8'	-18.0'	108.2°	9°08.0'	-18.9'	108.3°	8°49.0'	-19.9'	108.5°	8°30.0'	-20.8'	108.6°	8°10.7'	-21.8'	108.8°	7°51.4'	-22.7'	108.9°	7°31.9'	-23.6'	109.0°	15
16	9°08.8'	-18.1'	109.1°	8°49.0'	-19.1'	109.3°	8°29.2'	-20.0'	109.4°	8°09.1'	-21.0'	109.6°	7°49.0'	-21.9'	109.7°	7°28.7'	-22.8'	109.8°	7°08.3'	-23.7'	109.9°	16
17	8°50.7'	-18.3'	110.1°	8°30.0'	-19.2'	110.2°	8°09.1'	-20.2'	110.4°	7°48.2'	-21.1'	110.5°	7°27.1'	-22.0'	110.6°	7°05.9'	-22.9'	110.8°	6°44.5'	-23.8'	110.9°	17
18	8°32.4'	-18.4'	111.1°	8°10.7'	-19.4'	111.2°	7°49.0'	-20.3'	111.3°	7°27.1'	-21.2'	111.5°	7°05.1'	-22.1'	111.6°	6°42.9'	-23.0'	111.7°	6°20.7'	-23.9'	111.8°	18
19	8°13.9'	-18.6'	112.0°	7°51.4'	-19.5'	112.2°	7°28.7'	-20.4'	112.3°	7°05.9'	-21.3'	112.4°	6°42.9'	-22.2'	112.5°	6°19.9'	-23.1'	112.6°	5°56.8'	-24.0'	112.7°	19
20	7°55.4'	-18.7'	113.0°	7°31.9'	-19.6'	113.1°	7°08.3'	-20.5'	113.2°	6°44.5'	-21.4'	113.3°	6°20.7'	-22.3'	113.5°	5°56.8'	-23.2'	113.5°	5°32.8'	-24.1'	113.6°	20
21	7°36.7'	-18.8'	113.9°	7°12.2'	-19.7'	114.1°	6°47.7'	-20.6'	114.2°	6°23.1'	-21.5'	114.3°	5°58.4'	-22.4'	114.4°	5°33.9'	-23.3'	114.5°	5°08.7'	-24.2'	114.6°	21
22	7°17.8'	-18.9'	114.9°	6°52.5'	-19.8'	115.0°	6°27.1'	-20.7'	115.1°	6°01.6'	-21.6'	115.2°	5°35.9'	-22.5'	115.3°	5°10.2'	-23.4'	115.4°	4°44.5'	-24.3'	115.5°	22
23	6°58.9'	-19.1'	115.9°	6°32.7'	-20.0'	116.0°	6°06.3'	-20.8'	116.1°	5°39.9'	-21.7'	116.2°	5°13.4'	-22.6'	116.2°	4°46.9'	-23.5'	116.3°	4°20.2'	-24.3'	116.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

76° 284° LHA

Latitude CONTRARY to DECLINATION

76° 284° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

75° 285° LHA

Latitude CONTRARY to Declination

75° 285° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	14°32.6'	-15.1'	93.7°	14°28.7'	-16.2'	94.0°	14°24.4'	-17.2'	94.2°	14°19.8'	-18.2'	94.5°	14°15.0'	-19.2'	94.7°	14°09.9'	-20.3'	95.0°	14°04.6'	-21.3'	95.2°	0
1	14°17.5'	-15.4'	94.7°	14°12.5'	-16.4'	95.0°	14°07.2'	-17.4'	95.2°	14°01.6'	-18.5'	95.5°	13°55.7'	-19.5'	95.7°	13°49.6'	-20.5'	96.0°	13°43.3'	-21.5'	96.2°	1
2	14°02.1'	-15.6'	95.7°	13°56.1'	-16.6'	96.0°	13°49.7'	-17.7'	96.2°	13°43.1'	-18.7'	96.4°	13°36.3'	-19.7'	96.7°	13°29.2'	-20.7'	96.9°	13°21.8'	-21.7'	97.2°	2
3	13°46.6'	-15.9'	96.7°	13°39.4'	-16.9'	96.9°	13°32.1'	-17.9'	97.2°	13°24.4'	-18.9'	97.4°	13°16.6'	-19.9'	97.7°	13°08.4'	-20.9'	97.9°	13°00.1'	-21.9'	98.1°	3
4	13°30.7'	-16.1'	97.7°	13°22.5'	-17.1'	97.9°	13°14.1'	-18.1'	98.2°	13°05.5'	-19.1'	98.4°	12°56.6'	-20.1'	98.6°	12°47.5'	-21.1'	98.8°	12°38.2'	-22.1'	99.1°	4
5	13°14.6'	-16.3'	98.7°	13°05.4'	-17.3'	98.9°	12°56.0'	-18.3'	99.1°	12°46.4'	-19.4'	99.4°	12°36.5'	-20.3'	99.6°	12°26.4'	-21.3'	99.8°	12°16.0'	-22.3'	100.0°	5
6	12°58.3'	-16.5'	99.7°	12°48.1'	-17.6'	99.9°	12°37.7'	-18.6'	100.1°	12°27.0'	-19.6'	100.3°	12°16.1'	-20.5'	100.6°	12°05.0'	-21.5'	100.8°	11°53.7'	-22.5'	101.0°	6
7	12°41.8'	-16.8'	100.7°	12°30.5'	-17.8'	100.9°	12°19.1'	-18.8'	101.1°	12°07.5'	-19.8'	101.3°	11°55.6'	-20.7'	101.5°	11°43.5'	-21.7'	101.7°	11°31.2'	-22.7'	101.9°	7
8	12°25.0'	-17.0'	101.6°	12°12.8'	-18.0'	101.9°	12°00.3'	-19.0'	102.1°	11°47.7'	-20.0'	102.3°	11°34.8'	-20.9'	102.5°	11°21.8'	-21.9'	102.7°	11°08.5'	-22.9'	102.9°	8
9	12°08.0'	-17.2'	102.6°	11°54.8'	-18.2'	102.8°	11°41.4'	-19.2'	103.0°	11°27.7'	-20.1'	103.2°	11°13.9'	-21.1'	103.4°	10°59.9'	-22.1'	103.6°	10°45.7'	-23.0'	103.8°	9
10	11°50.8'	-17.4'	103.6°	11°36.6'	-18.4'	103.8°	11°22.2'	-19.4'	104.0°	11°07.6'	-20.3'	104.2°	10°52.8'	-21.3'	104.4°	10°37.8'	-22.3'	104.6°	10°22.6'	-23.2'	104.7°	10
11	11°33.5'	-17.6'	104.6°	11°18.3'	-18.6'	104.8°	11°02.9'	-19.5'	105.0°	10°47.3'	-20.5'	105.2°	10°31.5'	-21.5'	105.3°	10°15.5'	-22.4'	105.5°	9°59.4'	-23.4'	105.7°	11
12	11°15.9'	-17.8'	105.6°	10°59.7'	-18.7'	105.7°	10°43.3'	-19.7'	105.9°	10°26.8'	-20.7'	106.1°	10°10.0'	-21.6'	106.3°	9°53.1'	-22.6'	106.5°	9°36.1'	-23.5'	106.6°	12
13	10°58.1'	-18.0'	106.5°	10°41.0'	-18.9'	106.7°	10°23.6'	-19.9'	106.9°	10°06.1'	-20.8'	107.1°	9°48.4'	-21.8'	107.2°	9°30.6'	-22.7'	107.4°	9°12.5'	-23.7'	107.5°	13
14	10°40.2'	-18.1'	107.5°	10°22.0'	-19.1'	107.7°	10°03.7'	-20.0'	107.8°	9°45.3'	-21.0'	108.0°	9°26.6'	-21.9'	108.2°	9°07.8'	-22.9'	108.3°	8°48.9'	-23.8'	108.5°	14
15	10°22.0'	-18.3'	108.5°	10°03.0'	-19.3'	108.6°	9°43.7'	-20.2'	108.8°	9°24.3'	-21.1'	109.0°	9°04.7'	-22.1'	109.1°	8°45.0'	-23.0'	109.3°	8°25.1'	-23.9'	109.4°	15
16	10°03.7'	-18.5'	109.4°	9°43.7'	-19.4'	109.6°	9°23.5'	-20.4'	109.8°	9°03.1'	-21.3'	109.9°	8°42.6'	-22.2'	110.1°	8°22.0'	-23.1'	110.2°	8°01.2'	-24.0'	110.3°	16
17	9°45.3'	-18.6'	110.4°	9°24.3'	-19.6'	110.6°	9°03.1'	-20.5'	110.7°	8°41.8'	-21.4'	110.9°	8°20.4'	-22.3'	111.0°	7°58.8'	-23.3'	111.1°	7°37.1'	-24.2'	111.3°	17
18	9°26.6'	-18.8'	111.4°	9°04.7'	-19.7'	111.5°	8°42.6'	-20.6'	111.7°	8°20.4'	-21.6'	111.8°	7°58.1'	-22.5'	111.9°	7°35.6'	-23.4'	112.1°	7°13.0'	-24.3'	112.2°	18
19	9°07.8'	-18.9'	112.3°	8°45.0'	-19.9'	112.5°	8°22.0'	-20.8'	112.6°	7°58.8'	-21.7'	112.7°	7°35.6'	-22.6'	112.9°	7°12.2'	-23.5'	113.0°	6°48.7'	-24.4'	113.1°	19
20	8°48.9'	-19.1'	113.3°	8°25.1'	-20.0'	113.4°	8°01.2'	-20.9'	113.6°	7°37.1'	-21.8'	113.7°	7°13.0'	-22.7'	113.8°	6°48.7'	-23.6'	113.9°	6°24.3'	-24.5'	114.0°	20
21	8°29.8'	-19.2'	114.2°	8°05.1'	-20.1'	114.4°	7°40.3'	-21.0'	114.5°	7°15.3'	-21.9'	114.6°	6°50.3'</									

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

74° 286° LHA

Latitude CONTRARY to Declination

74° 286° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	15°30.7'	-15.2'	94.0°	15°26.5'	-16.2'	94.2°	15°21.9'	-17.3'	94.5°	15°17.0'	-18.3'	94.8°	15°11.8'	-19.3'	95.1°	15°06.4'	-20.4'	95.3°	15°00.7'	-21.4'	95.6°	0
1	15°15.5'	-15.5'	95.0°	15°10.2'	-16.5'	95.2°	15°04.6'	-17.5'	95.5°	14°58.7'	-18.6'	95.8°	14°52.5'	-19.6'	96.0°	14°46.1'	-20.6'	96.3°	14°39.3'	-21.6'	96.6°	1
2	15°00.0'	-15.7'	96.0°	14°53.7'	-16.8'	96.2°	14°47.1'	-17.8'	96.5°	14°40.1'	-18.8'	96.8°	14°32.9'	-19.8'	97.0°	14°25.5'	-20.8'	97.3°	14°17.7'	-21.8'	97.5°	2
3	14°44.4'	-16.0'	97.0°	14°36.9'	-17.0'	97.2°	14°29.3'	-18.0'	97.5°	14°21.3'	-19.1'	97.7°	14°13.1'	-20.1'	98.0°	14°04.6'	-21.1'	98.2°	13°55.9'	-22.1'	98.5°	3
4	14°28.4'	-16.2'	98.0°	14°19.9'	-17.3'	98.2°	14°11.2'	-18.3'	98.5°	14°02.2'	-19.3'	98.7°	13°53.0'	-20.3'	99.0°	13°43.5'	-21.3'	99.2°	13°33.8'	-22.3'	99.4°	4
5	14°12.1'	-16.5'	99.0°	14°02.7'	-17.5'	99.2°	13°52.9'	-18.5'	99.5°	13°43.0'	-19.5'	99.7°	13°32.7'	-20.5'	99.9°	13°22.3'	-21.5'	100.2°	13°11.5'	-22.5'	100.4°	5
6	13°55.7'	-16.7'	100.0°	13°45.2'	-17.7'	100.2°	13°34.4'	-18.7'	100.4°	13°23.4'	-19.7'	100.7°	13°12.2'	-20.7'	100.9°	13°00.7'	-21.7'	101.1°	12°49.0'	-22.7'	101.4°	6
7	13°38.9'	-17.0'	100.9°	13°27.4'	-18.0'	101.2°	13°15.7'	-19.0'	101.4°	13°03.7'	-20.0'	101.6°	12°51.5'	-20.9'	101.9°	12°39.0'	-21.9'	102.1°	12°26.3'	-22.9'	102.3°	7
8	13°22.0'	-17.2'	101.9°	13°09.5'	-18.2'	102.2°	12°56.7'	-19.2'	102.4°	12°43.7'	-20.2'	102.6°	12°30.5'	-21.2'	102.8°	12°17.1'	-22.1'	103.0°	12°03.5'	-23.1'	103.2°	8
9	13°04.8'	-17.4'	102.9°	12°51.3'	-18.4'	103.1°	12°37.5'	-19.4'	103.4°	12°23.6'	-20.4'	103.6°	12°09.4'	-21.3'	103.8°	11°55.0'	-22.3'	104.0°	11°40.4'	-23.3'	104.2°	9
10	12°47.4'	-17.6'	103.9°	12°32.9'	-18.6'	104.1°	12°18.1'	-19.6'	104.3°	12°03.2'	-20.6'	104.5°	11°48.0'	-21.5'	104.7°	11°32.7'	-22.5'	104.9°	11°17.1'	-23.4'	105.1°	10
11	12°29.8'	-17.8'	104.9°	12°14.3'	-18.8'	105.1°	11°58.5'	-19.8'	105.3°	11°42.6'	-20.8'	105.5°	11°26.5'	-21.7'	105.7°	11°10.2'	-22.7'	105.9°	10°53.6'	-23.6'	106.1°	11
12	12°11.9'	-18.0'	105.9°	11°55.4'	-19.0'	106.1°	11°38.7'	-20.0'	106.3°	11°21.9'	-20.9'	106.5°	11°04.8'	-21.9'	106.6°	10°47.5'	-22.8'	106.8°	10°30.0'	-23.8'	107.0°	12
13	11°53.9'	-18.2'	106.8°	11°36.4'	-19.2'	107.0°	11°18.8'	-20.2'	107.2°	11°00.9'	-21.1'	107.4°	10°42.9'	-22.1'	107.6°	10°24.6'	-23.0'	107.8°	10°06.2'	-23.9'	107.9°	13
14	11°35.7'	-18.4'	107.8°	11°17.2'	-19.4'	108.0°	10°58.6'	-20.4'	108.2°	10°39.8'	-21.3'	108.4°	10°20.8'	-22.2'	108.5°	10°01.6'	-23.2'	108.7°	9°42.3'	-24.1'	108.9°	14
15	11°17.2'	-18.6'	108.8°	10°57.8'	-19.6'	109.0°	10°38.2'	-20.5'	109.1°	10°18.5'	-21.5'	109.3°	9°58.6'	-22.4'	109.5°	9°38.5'	-23.3'	109.6°	9°18.2'	-24.2'	109.8°	15
16	10°58.6'	-18.8'	109.7°	10°38.2'	-19.8'	109.9°	10°17.7'	-20.7'	110.1°	9°57.0'	-21.6'	110.3°	9°36.2'	-22.5'	110.4°	9°15.1'	-23.5'	110.6°	8°54.0'	-24.4'	110.7°	16
17	10°39.8'	-19.0'	110.7°	10°18.5'	-19.9'	110.9°	9°57.0'	-20.9'	111.0°	9°35.4'	-21.8'	111.2°	9°13.6'	-22.7'	111.4°	8°51.7'	-23.6'	111.5°	8°29.6'	-24.5'	111.7°	17
18	10°20.8'	-19.2'	111.7°	9°58.6'	-20.1'	111.8°	9°36.2'	-21.0'	112.0°	9°13.6'	-21.9'	112.2°	8°50.9'	-22.8'	112.3°	8°28.1'	-23.7'	112.4°	8°05.1'	-24.6'	112.6°	18
19	10°01.6'	-19.3'	112.6°	9°38.5'	-20.2'	112.8°	9°15.1'	-21.2'	112.9°	8°51.7'	-22.1'	113.1°	8°28.1'	-23.0'	113.2°	8°04.4'	-23.9'	113.4°	7°40.5'	-24.7'	113.5°	19
20	9°42.3'	-19.5'	113.6°	9°18.2'	-20.4'	113.7°	8°54.0'	-21.3'	113.9°	8°29.6'	-22.2'	114.0°	8°05.1'	-23.1'	114.2°	7°40.5'	-24.0'	114.3°	7°15.8'	-24.9'	114.4°	20
21	9°22.8'	-19.6'	114.6°	8°57.8'	-20.5'	114.7°	8°32.7'	-21.4'	114.8°	8°07.4'	-22.3'	115.0°	7°42.0'	-23.2'	115.1°	7°16.5'	-24.1'	115.2°	6°50.9'	-25.0'	115.3°	21
22	9°03.2'	-19.8'	115.5°	8°37.3'	-20.7'	115.7°	8°11.2'	-21.6'	115.8°	7°45.1'	-22.5'	115.9°	7°18.8'	-23.3'	116.0°	6°52.4'	-24.2'	116.1°	6°25.9'	-25.1'	116.2°	22
23	8°43.4'	-19.9'	116.5°	8°16.6'	-20.8'	116.6°	7°49.7'	-21.7'	116.7°	7°22.6'	-22.6'	116.8°	6°55.5'	-23.4'	117.0°	6°28.2'	-24.3'	117.1°	6°00.9'	-25.1'	117.2°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

74° 286° LHA

Latitude CONTRARY to DECLINATION

74° 286° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

73° 287° LHA

Latitude CONTRARY to Declination

73° 287° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	16°28.8'	-15.3'	94.2°	16°24.2'	-16.3'	94.5°	16°19.4'	-17.4'	94.8°	16°14.2'	-18.4'	95.1°	16°08.7'	-19.4'	95.4°	16°02.9'	-20.5'	95.7°	15°56.8'	-21.5'	96.0°	0
1	16°13.5'	-15.6'	95.2°	16°07.9'	-16.6'	95.5°	16°02.0'	-17.6'	95.8°	15°55.8'	-18.7'	96.1°	15°49.2'	-19.7'	96.4°	15°42.4'	-20.7'	96.7°	15°35.3'	-21.7'	96.9°	1
2	15°57.9'	-15.8'	96.2°	15°51.3'	-16.9'	96.5°	15°44.3'	-17.9'	96.8°	15°37.1'	-18.9'	97.1°	15°29.5'	-20.0'	97.4°	15°21.7'	-21.0'	97.6°	15°13.6'	-22.0'	97.9°	2
3	15°42.1'	-16.1'	97.2°	15°34.4'	-17.2'	97.5°	15°26.4'	-18.2'	97.8°	15°18.1'	-19.2'	98.1°	15°09.6'	-20.2'	98.3°	15°00.7'	-21.2'	98.6°	14°51.6'	-22.2'	98.9°	3
4	15°26.0'	-16.4'	98.2°	15°17.3'	-17.4'	98.5°	15°08.2'	-18.4'	98.8°	14°58.9'	-19.5'	99.1°	14°49.4'	-20.5'	99.3°	14°39.5'	-21.5'	99.6°	14°29.4'	-22.4'	99.8°	4
5	15°09.6'	-16.6'	99.2°	14°59.9'	-17.7'	99.5°	14°49.8'	-18.7'	99.8°	14°39.5'	-19.7'	100.0°	14°28.9'	-20.7'	100.3°	14°18.1'	-21.7'	100.5°	14°07.0'	-22.7'	100.8°	5
6	14°53.0'	-16.9'	100.2°	14°42.2'	-17.9'	100.5°	14°31.1'	-18.9'	100.8°	14°19.8'	-19.9'	101.0°	14°08.2'	-20.9'	101.3°	13°56.4'	-21.9'	101.5°	13°44.3'	-22.9'	101.7°	6
7	14°36.1'	-17.2'	101.2°	14°24.3'	-18.2'	101.5°	14°12.2'	-19.2'	101.7°	13°59.9'	-20.2'	102.0°	13°47.3'	-21.2'	102.2°	13°34.5'	-22.1'	102.5°	13°21.4'	-23.1'	102.7°	7
8	14°18.9'	-17.4'	102.2°	14°06.1'	-18.4'	102.5°	13°53.0'	-19.4'	102.7°	13°39.7'	-20.4'	102.9°	13°26.1'	-21.4'	103.2°	13°12.3'	-22.3'	103.4°	12°58.3'	-23.3'	103.6°	8
9	14°01.5'	-17.6'	103.2°	13°47.7'	-18.6'	103.4°	13°33.6'	-19.6'	103.7°	13°19.3'	-20.6'	103.9°	13°04.8'	-21.6'	104.1°	12°50.0'	-22.6'	104.4°	12°35.0'	-23.5'	104.6°	9
10	13°43.9'	-17.9'	104.2°	13°29.0'	-18.9'	104.4°	13°14.0'	-19.8'	104.7°	12°58.7'	-20.8'	104.9°	12°43.2'	-21.8'	105.1°	12°27.4'	-22.7'	105.3°	12°11.5'	-23.7'	105.5°	10
11	13°26.0'	-18.1'	105.2°	13°10.2'	-19.1'	105.4°	12°54.1'	-20.1'	105.6°	12°37.9'	-21.0'	105.8°	12°21.4'	-22.0'	106.1°	12°04.7'	-22.9'	106.3°	11°47.8'	-23.9'	106.5°	11
12	13°07.9'	-18.3'	106.2°	12°51.1'	-19.3'	106.4°	12°34.1'	-20.3'	106.6°	12°16.8'	-21.2'	106.8°	11°59.4'	-22.2'	107.0°	11°41.7'	-23.1'	107.2°	11°23.9'	-24.1'	107.4°	12
13	12°49.6'	-18.5'	107.1°	12°31.8'	-19.5'	107.3°	12°13.8'	-20.5'	107.6°	11°55.6'	-21.4'	107.8°	11°37.2'	-22.4'	108.0°	11°18.6'	-23.3'	108.1°	10°59.8'	-24.2'	108.3°	13
14	12°31.0'	-18.7'	108.1°	12°12.3'	-19.7'	108.3°	11°53.3'	-20.7'	108.5°	11°34.2'	-21.6'	108.7°	11°14.8'	-22.5'	108.9°	10°55.3'	-23.5'	109.1°	10°35.6'	-24.4'	109.3°	14
15	12°12.3'	-19.0'	109.1°	11°52.6'	-19.9'	109.3°	11°32.7'	-20.9'	109.5°	11°12.6'	-21.8'	109.7°	10°52.3'	-22.7'	109.8°	10°31.8'	-23.6'	110.0°	10°11.2'	-24.6'	110.2°	15
16	11°53.3'	-19.2'	110.0°	11°32.7'	-20.1'	110.2°	11°11.8'	-21.0'	110.4°	10°50.8'	-22.0'	110.6°	10°29.6'	-22.9'	110.8°	10°08.2'	-23.8'	111.0°	9°46.7'	-24.7'	111.1°	16
17	11°34.2'	-19.3'	111.0°	11°12.6'	-20.3'	111.2°	10°50.8'	-21.2'	111.4°	10°28.8'	-22.1'	111.6°	10°06.7'	-23.0'	111.7°	9°44.4'	-23.9'	111.9°	9°22.0'	-24.8'	112.0°	17
18	11°14.8'	-19.5'	112.0°	10°52.3'	-20.5'	112.2°	10°29.6'	-21.4'	112.3°	10°06.7'	-22.3'	112.5°	9°43.6'	-23.2'	112.7°	9°20.4'	-24.1'	112.8°	8°57.1'	-25.0'	113.0°	18
19	10°55.3'	-19.7'	112.9°	10°31.8'	-20.6'	113.1°	10°08.2'	-21.5'	113.3°	9°44.4'	-22.4'	113.4°	9°20.4'	-23.3'	113.6°	8°56.4'	-24.2'	113.7°	8°32.1'	-25.1'	113.9°	19
20	10°35.6'	-19.9'	113.9°	10°11.2'	-20.8'	114.1°	9°46.7'	-21.7'	114.2°	9°22.0'	-22.6'	114.4°	8°57.1'	-23.5'	114.5°	8°32.1'	-24.4'	114.7°	8°07.0'	-25.2'	114.8°	20
21	10°15.7'	-20.1'	114.9°	9°50.4'	-21.0'	115.0°																

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

72° 288° LHA

Latitude CONTRARY to Declination

72° 288° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	17°26.8'	-15.4'	94.5°	17°22.0'	-16.4'	94.8°	17°16.8'	-17.5'	95.1°	17°11.3'	-18.5'	95.4°	17°05.5'	-19.5'	95.7°	16°59.3'	-20.6'	96.0°	16°52.8'	-21.6'	96.3°	0
1	17°11.5'	-15.7'	95.5°	17°05.6'	-16.7'	95.8°	16°59.3'	-17.8'	96.1°	16°52.8'	-18.8'	96.4°	16°45.9'	-19.8'	96.7°	16°38.7'	-20.8'	97.0°	16°31.3'	-21.9'	97.3°	1
2	16°55.8'	-16.0'	96.5°	16°48.9'	-17.0'	96.8°	16°41.6'	-18.0'	97.1°	16°34.0'	-19.1'	97.4°	16°26.1'	-20.1'	97.7°	16°17.9'	-21.1'	98.0°	16°09.4'	-22.1'	98.3°	2
3	16°39.9'	-16.3'	97.5°	16°31.9'	-17.3'	97.8°	16°23.5'	-18.3'	98.1°	16°14.9'	-19.3'	98.4°	16°06.0'	-20.4'	98.7°	15°56.8'	-21.4'	99.0°	15°47.3'	-22.4'	99.3°	3
4	16°23.6'	-16.5'	98.5°	16°14.6'	-17.6'	98.8°	16°05.2'	-18.6'	99.1°	15°55.6'	-19.6'	99.4°	15°45.6'	-20.6'	99.7°	15°35.4'	-21.6'	99.9°	15°24.9'	-22.6'	100.2°	4
5	16°07.1'	-16.8'	99.5°	15°57.0'	-17.8'	99.8°	15°46.6'	-18.9'	100.1°	15°36.0'	-19.9'	100.4°	15°25.0'	-20.9'	100.6°	15°13.8'	-21.9'	100.9°	15°02.3'	-22.9'	101.2°	5
6	15°50.2'	-17.1'	100.5°	15°39.1'	-18.1'	100.8°	15°27.7'	-19.1'	101.1°	15°16.1'	-20.1'	101.3°	15°04.1'	-21.1'	101.6°	14°51.9'	-22.1'	101.9°	14°39.4'	-23.1'	102.1°	6
7	15°33.1'	-17.4'	101.5°	15°21.0'	-18.4'	101.8°	15°08.6'	-19.4'	102.1°	14°55.9'	-20.4'	102.3°	14°43.0'	-21.4'	102.6°	14°29.8'	-22.3'	102.8°	14°16.4'	-23.3'	103.1°	7
8	15°15.8'	-17.6'	102.5°	15°02.6'	-18.6'	102.8°	14°49.2'	-19.6'	103.0°	14°35.6'	-20.6'	103.3°	14°21.6'	-21.6'	103.5°	14°07.5'	-22.6'	103.8°	13°53.0'	-23.5'	104.0°	8
9	14°58.2'	-17.9'	103.5°	14°44.0'	-18.9'	103.8°	14°29.6'	-19.9'	104.0°	14°14.9'	-20.9'	104.3°	14°00.0'	-21.8'	104.5°	13°44.9'	-22.8'	104.7°	13°29.5'	-23.8'	105.0°	9
10	14°40.3'	-18.1'	104.5°	14°25.1'	-19.1'	104.7°	14°09.7'	-20.1'	105.0°	13°54.1'	-21.1'	105.2°	13°38.2'	-22.0'	105.5°	13°22.1'	-23.0'	105.7°	13°05.7'	-24.0'	105.9°	10
11	14°22.1'	-18.4'	105.5°	14°06.0'	-19.4'	105.7°	13°49.6'	-20.3'	106.0°	13°33.0'	-21.3'	106.2°	13°16.2'	-22.3'	106.4°	12°59.1'	-23.2'	106.6°	12°41.8'	-24.2'	106.9°	11
12	14°03.8'	-18.6'	106.5°	13°46.7'	-19.6'	106.7°	13°29.3'	-20.6'	106.9°	13°11.7'	-21.5'	107.2°	12°53.9'	-22.5'	107.4°	12°35.9'	-23.4'	107.6°	12°17.6'	-24.3'	107.8°	12
13	13°45.2'	-18.8'	107.4°	13°27.1'	-19.8'	107.7°	13°08.7'	-20.8'	107.9°	12°50.2'	-21.7'	108.1°	12°31.4'	-22.7'	108.3°	12°12.5'	-23.6'	108.5°	11°53.3'	-24.5'	108.7°	13
14	13°26.3'	-19.1'	108.4°	13°07.3'	-20.0'	108.6°	12°48.0'	-21.0'	108.9°	12°28.5'	-21.9'	109.1°	12°08.8'	-22.9'	109.3°	11°48.9'	-23.8'	109.5°	11°28.8'	-24.7'	109.7°	14
15	13°07.3'	-19.3'	109.4°	12°47.2'	-20.2'	109.6°	12°27.0'	-21.2'	109.8°	12°06.5'	-22.1'	110.0°	11°45.9'	-23.0'	110.2°	11°25.1'	-24.0'	110.4°	11°04.0'	-24.9'	110.6°	15
16	12°48.0'	-19.5'	110.4°	12°27.0'	-20.4'	110.6°	12°05.8'	-21.4'	110.8°	11°44.4'	-22.3'	111.0°	11°22.9'	-23.2'	111.2°	11°01.1'	-24.1'	111.3°	10°39.2'	-25.0'	111.5°	16
17	12°28.5'	-19.7'	111.3°	12°06.5'	-20.6'	111.5°	11°44.4'	-21.6'	111.7°	11°22.1'	-22.5'	111.9°	10°59.6'	-23.4'	112.1°	10°37.0'	-24.3'	112.3°	10°14.1'	-25.2'	112.5°	17
18	12°08.8'	-19.9'	112.3°	11°45.9'	-20.8'	112.5°	11°22.9'	-21.8'	112.7°	10°59.6'	-22.7'	112.9°	10°36.2'	-23.6'	113.0°	10°12.7'	-24.5'	113.2°	9°48.9'	-25.3'	113.4°	18
19	11°48.9'	-20.1'	113.3°	11°25.1'	-21.0'	113.5°	11°01.1'	-21.9'	113.6°	10°37.0'	-22.8'	113.8°	10°12.7'	-23.7'	114.0°	9°48.2'	-24.6'	114.1°	9°23.6'	-25.5'	114.3°	19
20	11°28.8'	-20.3'	114.2°	11°04.0'	-21.2'	114.4°	10°39.2'	-22.1'	114.6°	10°14.1'	-23.0'	114.7°	9°48.9'	-23.9'	114.9°	9°23.6'	-24.8'	115.1°	8°58.1'	-25.6'	115.2°	20
21	11°08.5'	-20.5'	115.2°	10°42.9'	-21.4'	115.4°	10°17.1'	-22.3'	115.5°	9°51.1'	-23.1'	115.7°	9°25.1'	-24.0'	115.8°	8°58.8'	-24.9'	116.0°	8°32.5'	-25.7'	116.1°	21
22	10°48.0'	-20.6'	116.1°	10°21.5'	-21.5'	116.3°	9°54.8'	-22.4'	116.5°	9°28.0'	-23.3'	116.6°	9°01.0'	-24.2'	116.8°	8°34.0'	-25.0'	116.9°	8°06.7'	-25.9'	117.0°	22
23	10°27.3'	-20.8'	117.1°	9°59.9'	-21.7'	117.3°	9°32.4'	-22.6'	117.4°	9°04.7'	-23.4'	117.6°	8°36.9'	-24.3'	117.7°	8°08.9'	-25.1'	117.8°	7°40.9'	-26.0'	117.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

72° 288° LHA

Latitude CONTRARY to DECLINATION

72° 288° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

71° 289° LHA

Latitude CONTRARY to Declination

71° 289° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	18°24.8'	-15.5'	94.8°	18°19.7'	-16.5'	95.1°	18°14.2'	-17.6'	95.4°	18°08.4'	-18.6'	95.7°	18°02.2'	-19.7'	96.1°	17°55.7'	-20.7'	96.4°	17°48.9'	-21.7'	96.7°	0
1	18°09.4'	-15.8'	95.8°	18°03.2'	-16.8'	96.1°	17°56.7'	-17.9'	96.4°	17°49.8'	-18.9'	96.7°	17°42.6'	-19.9'	97.1°	17°35.0'	-21.0'	97.4°	17°27.2'	-22.0'	97.7°	1
2	17°53.6'	-16.1'	96.8°	17°46.4'	-17.1'	97.1°	17°38.8'	-18.2'	97.4°	17°30.9'	-19.2'	97.7°	17°22.6'	-20.2'	98.1°	17°14.1'	-21.3'	98.4°	17°05.2'	-22.3'	98.7°	2
3	17°37.6'	-16.4'	97.8°	17°29.3'	-17.4'	98.1°	17°20.6'	-18.5'	98.4°	17°11.7'	-19.5'	98.7°	17°02.4'	-20.5'	99.0°	16°52.8'	-21.5'	99.3°	16°42.9'	-22.5'	99.6°	3
4	17°21.2'	-16.7'	98.8°	17°11.8'	-17.7'	99.1°	17°02.1'	-18.8'	99.4°	16°52.2'	-19.8'	99.7°	16°41.9'	-20.8'	100.0°	16°31.3'	-21.8'	100.3°	16°20.4'	-22.8'	100.6°	4
5	17°04.5'	-17.0'	99.8°	16°54.1'	-18.0'	100.1°	16°43.4'	-19.1'	100.4°	16°32.4'	-20.1'	100.7°	16°21.1'	-21.1'	101.0°	16°09.5'	-22.1'	101.3°	15°57.6'	-23.1'	101.6°	5
6	16°47.5'	-17.3'	100.8°	16°36.0'	-18.3'	101.1°	16°24.3'	-19.3'	101.4°	16°12.3'	-20.3'	101.7°	15°60.0'	-21.3'	102.0°	15°47.4'	-22.3'	102.3°	15°34.5'	-23.3'	102.5°	6
7	16°30.2'	-17.6'	101.8°	16°17.7'	-18.6'	102.1°	16°05.0'	-19.6'	102.4°	15°52.0'	-20.6'	102.7°	15°38.7'	-21.6'	102.9°	15°25.1'	-22.6'	103.2°	15°11.2'	-23.5'	103.5°	7
8	16°12.6'	-17.9'	102.8°	15°59.1'	-18.9'	103.1°	15°45.4'	-19.9'	103.4°	15°31.4'	-20.9'	103.6°	15°17.1'	-21.8'	103.9°	15°02.5'	-22.8'	104.2°	14°47.7'	-23.8'	104.4°	8
9	15°54.7'	-18.1'	103.8°	15°40.3'	-19.1'	104.1°	15°25.5'	-20.1'	104.4°	15°10.5'	-21.1'	104.6°	14°55.2'	-22.1'	104.9°	14°39.7'	-23.0'	105.1°	14°23.9'	-24.0'	105.4°	9
10	15°36.6'	-18.4'	104.8°	15°21.1'	-19.4'	105.1°	15°05.4'	-20.4'	105.3°	14°49.4'	-21.3'	105.6°	14°33.2'	-22.3'	105.8°	14°16.7'	-23.3'	106.1°	13°59.9'	-24.2'	106.3°	10
11	15°18.2'	-18.7'	105.8°	15°01.8'	-19.6'	106.1°	14°45.0'	-20.6'	106.3°	14°28.1'	-21.6'	106.6°	14°10.8'	-22.5'	106.8°	13°53.4'	-23.5'	107.0°	13°35.7'	-24.4'	107.3°	11
12	14°59.6'	-18.9'	106.8°	14°42.1'	-19.9'	107.0°	14°24.4'	-20.9'	107.3°	14°06.5'	-21.8'	107.5°	13°48.3'	-22.8'	107.8°	13°29.9'	-23.7'	108.0°	13°11.3'	-24.6'	108.2°	12
13	14°40.7'	-19.2'	107.8°	14°22.2'	-20.1'	108.0°	14°03.6'	-21.1'	108.2°	13°44.7'	-22.0'	108.5°	13°25.5'	-23.0'	108.7°	13°06.2'	-23.9'	108.9°	12°46.6'	-24.8'	109.1°	13
14	14°21.5'	-19.4'	108.7°	14°02.1'	-20.4'	109.0°	13°42.5'	-21.3'	109.2°	13°22.6'	-22.2'	109.4°	13°02.6'	-23.2'	109.7°	12°42.3'	-24.1'	109.9°	12°21.8'	-25.0'	110.1°	14
15	14°02.1'	-19.6'	109.7°	13°41.8'	-20.6'	109.9°	13°21.2'	-21.5'	110.2°	13°00.4'	-22.5'	110.4°	12°39.4'	-23.4'	110.6°	12°18.2'	-24.3'	110.8°	11°56.8'	-25.2'	111.0°	15
16	13°42.5'	-19.9'	110.7°	13°21.2'	-20.8'	110.9°	12°59.7'	-21.7'	111.1°	12°37.9'	-22.7'	111.3°	12°16.0'	-23.6'	111.5°	11°53.9'	-24.5'	111.7°	11°31.5'	-25.4'	111.9°	16
17	13°22.6'	-20.1'	111.7°	13°00.4'	-21.0'	111.9°	12°37.9'	-21.9'	112.1°	12°15.3'	-22.9'	112.3°	11°52.4'	-23.8'	112.5°	11°29.4'	-24.7'	112.7°	11°06.2'	-25.6'	112.9°	17
18	13°02.6'	-20.3'	112.6°	12°39.4'	-21.2'	112.8°	12°16.0'	-22.1'	113.0°	11°52.4'	-23.0'	113.2°	11°28.7'	-23.9'	113.4°	11°04.7'	-24.8'	113.6°	10°40.6'	-25.7'	113.8°	18
19	12°42.3'	-20.5'	113.6°	12°18.2'	-21.4'	113.8°	11°53.9'	-22.3'	114.0°	11°29.4'	-23.2'	114.2°	11°04.7'	-24.1'	114.4°	10°39.9'	-25.0'	114.5°	10°14.9'	-25.9'	114.7°	19
20	12°21.8'	-20.7'	114.6°	11°56.8'	-21.6'	114.7°	11°31.5'	-22.5'	114.9°	11°06.2'	-23.4'	115.1°	10°40.6'	-24.3'	115.3°	10°14.9'	-25.2'	115.5°	9°49.0'	-26.0'	115.6°	20
21</																						

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

70° 290° LHA

Latitude CONTRARY to Declination

70° 290° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	19°22.9'	-15.6'	95.0°	19°17.5'	-16.6'	95.4°	19°11.7'	-17.7'	95.7°	19°05.5'	-18.7'	96.1°	18°59.0'	-19.8'	96.4°	18°52.1'	-20.8'	96.8°	18°44.8'	-21.8'	97.1°	0
1	19°07.3'	-15.9'	96.1°	19°00.8'	-17.0'	96.4°	18°54.0'	-18.0'	96.7°	18°46.8'	-19.0'	97.1°	18°39.2'	-20.1'	97.4°	18°31.3'	-21.1'	97.7°	18°23.0'	-22.1'	98.1°	1
2	18°51.4'	-16.2'	97.1°	18°43.9'	-17.3'	97.4°	18°36.0'	-18.3'	97.7°	18°27.7'	-19.4'	98.1°	18°19.1'	-20.4'	98.4°	18°10.2'	-21.4'	98.7°	18°00.9'	-22.4'	99.1°	2
3	18°35.2'	-16.6'	98.1°	18°26.6'	-17.6'	98.4°	18°17.6'	-18.6'	98.8°	18°08.3'	-19.7'	99.1°	17°58.7'	-20.7'	99.4°	17°48.8'	-21.7'	99.7°	17°38.5'	-22.7'	100.0°	3
4	18°18.7'	-16.9'	99.1°	18°09.0'	-17.9'	99.4°	17°59.0'	-18.9'	99.8°	17°48.7'	-20.0'	100.1°	17°38.0'	-21.0'	100.4°	17°27.1'	-22.0'	100.7°	17°15.8'	-23.0'	101.0°	4
5	18°01.8'	-17.2'	100.1°	17°51.1'	-18.2'	100.4°	17°40.1'	-19.2'	100.7°	17°28.7'	-20.3'	101.1°	17°17.0'	-21.3'	101.4°	17°05.1'	-22.3'	101.7°	16°52.8'	-23.3'	102.0°	5
6	17°44.6'	-17.5'	101.1°	17°32.9'	-18.5'	101.4°	17°20.8'	-19.5'	101.7°	17°08.5'	-20.5'	102.0°	16°55.8'	-21.5'	102.3°	16°42.8'	-22.5'	102.6°	16°29.5'	-23.5'	102.9°	6
7	17°27.1'	-17.8'	102.1°	17°14.4'	-18.8'	102.4°	17°01.3'	-19.8'	102.7°	16°47.9'	-20.8'	103.0°	16°34.2'	-21.8'	103.3°	16°20.3'	-22.8'	103.6°	16°06.0'	-23.8'	103.9°	7
8	17°09.3'	-18.1'	103.1°	16°55.5'	-19.1'	103.4°	16°41.5'	-20.1'	103.7°	16°27.1'	-21.1'	104.0°	16°12.4'	-22.1'	104.3°	15°57.5'	-23.1'	104.6°	15°42.2'	-24.0'	104.8°	8
9	16°51.2'	-18.4'	104.1°	16°36.4'	-19.4'	104.4°	16°21.4'	-20.4'	104.7°	16°06.0'	-21.4'	105.0°	15°50.3'	-22.3'	105.3°	15°34.4'	-23.3'	105.5°	15°18.2'	-24.3'	105.8°	9
10	16°32.8'	-18.7'	105.1°	16°17.1'	-19.7'	105.4°	16°01.0'	-20.6'	105.7°	15°44.6'	-21.6'	106.0°	15°28.0'	-22.6'	106.2°	15°11.1'	-23.5'	106.5°	14°54.0'	-24.5'	106.7°	10
11	16°14.2'	-18.9'	106.1°	15°57.4'	-19.9'	106.4°	15°40.3'	-20.9'	106.7°	15°23.0'	-21.9'	106.9°	15°05.4'	-22.8'	107.2°	14°47.6'	-23.8'	107.4°	14°29.5'	-24.7'	107.7°	11
12	15°55.3'	-19.2'	107.1°	15°37.5'	-20.2'	107.4°	15°19.4'	-21.2'	107.6°	15°01.1'	-22.1'	107.9°	14°42.6'	-23.1'	108.1°	14°23.8'	-24.0'	108.4°	14°04.7'	-24.9'	108.6°	12
13	15°36.1'	-19.5'	108.1°	15°17.3'	-20.4'	108.3°	14°58.3'	-21.4'	108.6°	14°39.0'	-22.3'	108.8°	14°19.5'	-23.3'	109.1°	13°59.8'	-24.2'	109.3°	13°39.8'	-25.1'	109.6°	13
14	15°16.6'	-19.7'	109.1°	14°56.9'	-20.7'	109.3°	14°36.9'	-21.6'	109.6°	14°16.7'	-22.6'	109.8°	13°56.2'	-23.5'	110.0°	13°35.6'	-24.4'	110.3°	13°14.7'	-25.3'	110.5°	14
15	14°56.9'	-20.0'	110.0°	14°36.2'	-20.9'	110.3°	14°15.3'	-21.9'	110.5°	13°54.1'	-22.8'	110.8°	13°32.7'	-23.7'	111.0°	13°11.1'	-24.6'	111.2°	12°49.3'	-25.5'	111.4°	15
16	14°36.9'	-20.2'	111.0°	14°15.3'	-21.2'	111.3°	13°53.4'	-22.1'	111.5°	13°31.3'	-23.0'	111.7°	13°09.0'	-23.9'	111.9°	12°46.5'	-24.8'	112.1°	12°23.8'	-25.7'	112.4°	16
17	14°16.7'	-20.4'	112.0°	13°54.1'	-21.4'	112.2°	13°31.3'	-22.3'	112.4°	13°08.3'	-23.2'	112.7°	12°45.1'	-24.1'	112.9°	12°21.7'	-25.0'	113.1°	11°58.0'	-25.9'	113.3°	17
18	13°56.2'	-20.7'	113.0°	13°32.7'	-21.6'	113.2°	13°09.0'	-22.5'	113.4°	12°45.1'	-23.4'	113.6°	12°20.9'	-24.3'	113.8°	11°56.6'	-25.2'	114.0°	11°32.1'	-26.1'	114.2°	18
19	13°35.6'	-20.9'	113.9°	13°11.1'	-21.8'	114.1°	12°46.5'	-22.7'	114.3°	12°21.7'	-23.6'	114.6°	11°56.6'	-24.5'	114.7°	11°31.4'	-25.4'	114.9°	11°06.0'	-26.3'	115.1°	19
20	13°14.7'	-21.1'	114.9°	12°49.3'	-22.0'	115.1°	12°23.8'	-22.9'	115.3°	11°58.0'	-23.8'	115.5°	11°32.1'	-24.7'	115.7°	11°06.0'	-25.6'	115.9°	10°39.8'	-26.4'	116.0°	20
21	12°53.5'	-21.3'	115.8°	12°27.3'	-22.2'	116.0°	12°00.9'	-23.1'	116.2°	11°34.2'	-24.0'	116.4°	11°07.4'	-24.9'	116.6°	10°40.5'	-25.7'	116.8°	10°13.4'	-26.6'	116.9°	21
22	12°32.2'	-21.5'	116.8°	12°05.1'	-22.4'	117.0°	11°37.7'	-23.3'	117.2°	11°10.2'	-24.2'	117.4°	10°42.6'	-25.0'	117.5°	10°14.8'	-25.9'	117.7°	9°46.8'	-26.7'	117.9°	22
23	12°10.7'	-21.7'	117.8°	11°42.7'	-22.6'	117.9°	11°14.5'	-23.5'	118.1°	10°46.1'	-24.3'	118.3°	10°17.6'	-25.2'	118.5°	9°48.9'	-26.0'	118.6°	9°20.1'	-26.8'	118.8°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

70° 290° LHA

Latitude CONTRARY to DECLINATION

70° 290° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

69° 291° LHA

Latitude CONTRARY to Declination

69° 291° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	20°20.8'	-15.7'	95.3°	20°15.1'	-16.7'	95.7°	20°09.0'	-17.8'	96.0°	20°02.5'	-18.8'	96.4°	19°55.6'	-19.9'	96.8°	19°48.4'	-20.9'	97.1°	19°40.8'	-22.0'	97.5°	0
1	20°05.2'	-16.0'	96.3°	19°58.4'	-17.1'	96.7°	19°51.2'	-18.1'	97.1°	19°43.7'	-19.2'	97.4°	19°35.8'	-20.2'	97.8°	19°27.5'	-21.3'	98.1°	19°18.8'	-22.3'	98.5°	1
2	19°49.2'	-16.4'	97.4°	19°41.3'	-17.4'	97.7°	19°33.1'	-18.5'	98.1°	19°24.5'	-19.5'	98.4°	19°15.5'	-20.5'	98.8°	19°06.2'	-21.6'	99.1°	18°56.5'	-22.6'	99.4°	2
3	19°32.8'	-16.7'	98.4°	19°23.9'	-17.8'	98.7°	19°14.6'	-18.8'	99.1°	19°05.0'	-19.8'	99.4°	18°55.0'	-20.9'	99.8°	18°44.6'	-21.9'	100.1°	18°34.0'	-22.9'	100.4°	3
4	19°16.1'	-17.0'	99.4°	19°06.2'	-18.1'	99.7°	18°55.8'	-19.1'	100.1°	18°45.1'	-20.2'	100.4°	18°34.1'	-21.2'	100.8°	18°22.8'	-22.2'	101.1°	18°11.1'	-23.2'	101.4°	4
5	18°59.1'	-17.4'	100.4°	18°48.1'	-18.4'	100.8°	18°36.7'	-19.4'	101.1°	18°25.0'	-20.5'	101.4°	18°13.0'	-21.5'	101.7°	18°00.6'	-22.5'	102.1°	17°47.9'	-23.5'	102.4°	5
6	18°41.7'	-17.7'	101.4°	18°29.6'	-18.7'	101.8°	18°17.3'	-19.8'	102.1°	18°04.5'	-20.8'	102.4°	17°51.5'	-21.8'	102.7°	17°38.1'	-22.8'	103.0°	17°24.4'	-23.7'	103.3°	6
7	18°24.0'	-18.0'	102.4°	18°10.9'	-19.0'	102.8°	17°57.5'	-20.1'	103.1°	17°43.8'	-21.1'	103.4°	17°29.7'	-22.1'	103.7°	17°15.4'	-23.0'	104.0°	17°00.7'	-24.0'	104.3°	7
8	18°06.0'	-18.3'	103.4°	17°51.9'	-19.3'	103.8°	17°37.4'	-20.3'	104.1°	17°22.7'	-21.3'	104.4°	17°07.7'	-22.3'	104.7°	16°52.3'	-23.3'	105.0°	16°36.7'	-24.3'	105.3°	8
9	17°47.6'	-18.6'	104.4°	17°32.5'	-19.6'	104.7°	17°17.1'	-20.6'	105.1°	17°01.4'	-21.6'	105.3°	16°45.3'	-22.6'	105.6°	16°29.0'	-23.6'	105.9°	16°12.4'	-24.5'	106.2°	9
10	17°29.0'	-18.9'	105.4°	17°12.9'	-19.9'	105.7°	16°56.5'	-20.9'	106.0°	16°39.7'	-21.9'	106.3°	16°22.7'	-22.9'	106.6°	16°05.5'	-23.8'	106.9°	15°47.9'	-24.8'	107.2°	10
11	17°10.1'	-19.2'	106.4°	16°53.0'	-20.2'	106.7°	16°35.5'	-21.2'	107.0°	16°17.9'	-22.2'	107.3°	15°59.9'	-23.1'	107.6°	15°41.6'	-24.1'	107.8°	15°23.1'	-25.0'	108.1°	11
12	16°50.9'	-19.5'	107.4°	16°32.7'	-20.5'	107.7°	16°14.4'	-21.5'	108.0°	15°55.7'	-22.4'	108.3°	15°36.8'	-23.4'	108.5°	15°17.6'	-24.3'	108.8°	14°58.1'	-25.2'	109.0°	12
13	16°31.3'	-19.8'	108.4°	16°12.3'	-20.8'	108.7°	15°52.9'	-21.7'	109.0°	15°33.3'	-22.7'	109.2°	15°13.4'	-23.6'	109.5°	14°53.3'	-24.5'	109.7°	14°32.9'	-25.5'	110.0°	13
14	16°11.6'	-20.1'	109.4°	15°51.5'	-21.0'	109.7°	15°31.2'	-22.0'	109.9°	15°10.6'	-22.9'	110.2°	14°49.8'	-23.8'	110.4°	14°28.7'	-24.8'	110.7°	14°07.4'	-25.7'	110.9°	14
15	15°51.5'	-20.3'	110.4°	15°30.5'	-21.3'	110.6°	15°09.2'	-22.2'	110.9°	14°47.7'	-23.1'	111.1°	14°25.9'	-24.1'	111.4°	14°03.9'	-25.0'	111.6°	13°41.7'	-25.9'	111.9°	15
16	15°31.2'	-20.6'	111.3°	15°09.2'	-21.5'	111.6°	14°47.0'	-22.5'	111.9°	14°24.5'	-23.4'	112.1°	14°01.9'	-24.3'	112.3°	13°39.0'	-25.2'	112.6°	13°15.8'	-26.1'	112.8°	16
17	15°10.6'	-20.8'	112.3°	14°47.7'	-21.8'	112.6°	14°24.5'	-22.7'	112.8°	14°01.2'	-23.6'	113.0°	13°37.6'	-24.5'	113.3°	13°13.8'	-25.4'	113.5°	12°49.7'	-26.3'	113.7°	17
18	14°49.8'	-21.1'	113.3°	14°25.9'	-22.0'	113.5°	14°01.9'	-22.9'	113.8°	13°37.6'	-23.8'	114.0°	13°13.1'	-24.7'	114.2°	12°48.4'	-25.6'	114.4°	12°23.5'	-26.5'	114.6°	18
19	14°28.7'	-21.3'	114.3°	14°03.9'	-22.2'	114.5°	13°39.0'	-23.1'	114.7°	13°13.8'	-24.0'	114.9°	12°48.4'	-24.9'	115.1°	12°22.8'	-25.8'	115.3°	11°57.0'	-26.6'	115.5°	19
20	14°07.4'	-21.5'	115.2°	13°41.7'	-22.4'	115.5°	13°15.8'	-23.3'	115.7°	12°49.7'	-24.2'	115.9°	12°23.5'	-25.1'	116.1°	11°57.0'	-26.0'	116.3°	11°30.4'	-26.8'</		

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

68° 292° LHA

Latitude CONTRARY to Declination

68° 292° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	21°18.8'	-15.8'	95.6°	21°12.8'	-16.8'	96.0°	21°06.4'	-17.9'	96.4°	20°59.5'	-19.0'	96.7°	20°52.3'	-20.0'	97.1°	20°44.7'	-21.1'	97.5°	20°36.6'	-22.1'	97.9°	0
1	21°03.0'	-16.1'	96.6°	20°56.0'	-17.2'	97.0°	20°48.5'	-18.3'	97.4°	20°40.6'	-19.3'	97.8°	20°32.3'	-20.4'	98.1°	20°23.6'	-21.4'	98.5°	20°14.5'	-22.4'	98.9°	1
2	20°46.9'	-16.5'	97.6°	20°38.7'	-17.6'	98.0°	20°30.2'	-18.6'	98.4°	20°21.2'	-19.7'	98.8°	20°11.9'	-20.7'	99.1°	20°02.2'	-21.7'	99.5°	19°52.1'	-22.8'	99.8°	2
3	20°30.4'	-16.9'	98.7°	20°21.2'	-17.9'	99.0°	20°11.6'	-19.0'	99.4°	20°01.6'	-20.0'	99.8°	19°51.2'	-21.0'	100.1°	19°40.5'	-22.1'	100.5°	19°29.4'	-23.1'	100.8°	3
4	20°13.5'	-17.2'	99.7°	20°03.2'	-18.3'	100.1°	19°52.6'	-19.3'	100.4°	19°41.5'	-20.3'	100.8°	19°30.2'	-21.4'	101.1°	19°18.4'	-22.4'	101.5°	19°06.3'	-23.4'	101.8°	4
5	19°56.3'	-17.6'	100.7°	19°45.0'	-18.6'	101.1°	19°33.3'	-19.6'	101.4°	19°21.2'	-20.7'	101.8°	19°08.8'	-21.7'	102.1°	18°56.0'	-22.7'	102.4°	18°42.9'	-23.7'	102.8°	5
6	19°38.7'	-17.9'	101.7°	19°26.4'	-18.9'	102.1°	19°13.6'	-20.0'	102.4°	19°00.5'	-21.0'	102.8°	18°47.1'	-22.0'	103.1°	18°33.3'	-23.0'	103.4°	18°19.2'	-24.0'	103.8°	6
7	19°20.8'	-18.3'	102.7°	19°07.4'	-19.3'	103.1°	18°53.6'	-20.3'	103.4°	18°39.5'	-21.3'	103.8°	18°25.1'	-22.3'	104.1°	18°10.4'	-23.3'	104.4°	17°55.3'	-24.3'	104.7°	7
8	19°02.6'	-18.6'	103.8°	18°48.1'	-19.6'	104.1°	18°33.4'	-20.6'	104.4°	18°18.2'	-21.6'	104.7°	18°02.8'	-22.6'	105.1°	17°47.1'	-23.6'	105.4°	17°31.0'	-24.5'	105.7°	8
9	18°44.0'	-18.9'	104.8°	18°28.5'	-19.9'	105.1°	18°12.8'	-20.9'	105.4°	17°56.7'	-21.9'	105.7°	17°40.2'	-22.9'	106.0°	17°23.5'	-23.8'	106.3°	17°06.5'	-24.8'	106.6°	9
10	18°25.1'	-19.2'	105.8°	18°08.6'	-20.2'	106.1°	17°51.8'	-21.2'	106.4°	17°34.8'	-22.2'	106.7°	17°17.4'	-23.1'	107.0°	16°59.7'	-24.1'	107.3°	16°41.7'	-25.1'	107.6°	10
11	18°05.9'	-19.5'	106.8°	17°48.4'	-20.5'	107.1°	17°30.6'	-21.5'	107.4°	17°12.6'	-22.5'	107.7°	16°54.2'	-23.4'	108.0°	16°35.6'	-24.4'	108.3°	16°16.6'	-25.3'	108.5°	11
12	17°46.3'	-19.8'	107.8°	17°27.9'	-20.8'	108.1°	17°09.2'	-21.8'	108.4°	16°50.1'	-22.7'	108.6°	16°30.8'	-23.7'	108.9°	16°11.2'	-24.6'	109.2°	15°51.3'	-25.6'	109.5°	12
13	17°26.5'	-20.1'	108.7°	17°07.1'	-21.1'	109.0°	16°47.4'	-22.0'	109.3°	16°27.4'	-23.0'	109.6°	16°07.1'	-23.9'	109.9°	15°46.6'	-24.9'	110.2°	15°25.8'	-25.8'	110.4°	13
14	17°06.4'	-20.4'	109.7°	16°46.0'	-21.4'	110.0°	16°25.3'	-22.3'	110.3°	16°04.4'	-23.3'	110.6°	15°43.2'	-24.2'	110.8°	15°21.7'	-25.1'	111.1°	14°60.0'	-26.0'	111.3°	14
15	16°46.0'	-20.7'	110.7°	16°24.7'	-21.6'	111.0°	16°03.0'	-22.6'	111.3°	15°41.1'	-23.5'	111.5°	15°19.0'	-24.4'	111.8°	14°56.6'	-25.3'	112.0°	14°34.0'	-26.2'	112.3°	15
16	16°25.3'	-20.9'	111.7°	16°03.0'	-21.9'	112.0°	15°40.5'	-22.8'	112.2°	15°17.6'	-23.7'	112.5°	14°54.6'	-24.7'	112.7°	14°31.3'	-25.6'	113.0°	14°07.7'	-26.5'	113.2°	16
17	16°04.4'	-21.2'	112.7°	15°41.1'	-22.1'	112.9°	15°17.6'	-23.1'	113.2°	14°53.9'	-24.0'	113.4°	14°29.9'	-24.9'	113.7°	14°05.7'	-25.8'	113.9°	13°41.3'	-26.7'	114.1°	17
18	15°43.2'	-21.5'	113.6°	15°19.0'	-22.4'	113.9°	14°54.6'	-23.3'	114.1°	14°29.9'	-24.2'	114.4°	14°05.0'	-25.1'	114.6°	13°39.9'	-26.0'	114.8°	13°14.6'	-26.9'	115.1°	18
19	15°21.7'	-21.7'	114.6°	14°56.6'	-22.6'	114.9°	14°31.3'	-23.5'	115.1°	14°05.7'	-24.4'	115.3°	13°39.9'	-25.3'	115.5°	13°14.0'	-26.2'	115.8°	12°47.8'	-27.0'	116.0°	19
20	14°60.0'	-22.0'	115.6°	14°34.0'	-22.9'	115.8°	14°07.7'	-23.8'	116.0°	13°41.3'	-24.6'	116.3°	13°14.6'	-25.5'	116.5°	12°47.8'	-26.4'	116.7°	12°20.7'	-27.2'	116.9°	20
21	14°38.0'	-22.2'	116.5°	14°11.1'	-23.1'	116.8°	13°44.0'	-24.0'	117.0°	13°16.6'	-24.8'	117.2°	12°49.1'	-25.7'	117.4°	12°21.4'	-26.6'	117.6°	11°53.5'	-27.4'	117.8°	21
22	14°15.8'	-22.4'	117.5°	13°48.0'	-23.3'	117.7°	13°20.0'	-24.2'	117.9°	12°51.8'	-25.0'	118.1°	12°23.4'	-25.9'	118.3°	11°54.9'	-26.7'	118.5°	11°26.1'	-27.6'	118.7°	22
23	13°53.4'	-22.7'	118.5°	13°24.7'	-23.5'	118.7°	12°55.8'	-24.4'	118.9°	12°26.8'	-25.2'	119.1°	11°57.5'	-26.1'	119.3°	11°28.1'	-26.9'	119.4°	10°58.5'	-27.7'	119.6°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

68° 292° LHA

Latitude CONTRARY to DECLINATION

68° 292° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

67° 293° LHA

Latitude CONTRARY to Declination

67° 293° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	22°16.7'	-15.9'	95.9°	22°10.4'	-17.0'	96.3°	22°03.7'	-18.0'	96.7°	21°56.5'	-19.1'	97.1°	21°48.9'	-20.2'	97.5°	21°40.9'	-21.2'	97.9°	21°32.5'	-22.2'	98.3°	0
1	22°00.8'	-16.3'	96.9°	21°53.5'	-17.4'	97.3°	21°45.6'	-18.4'	97.7°	21°37.4'	-19.5'	98.1°	21°28.7'	-20.5'	98.5°	21°19.7'	-21.6'	98.9°	21°10.2'	-22.6'	99.3°	1
2	21°44.6'	-16.7'	97.9°	21°36.1'	-17.7'	98.3°	21°27.2'	-18.8'	98.7°	21°17.9'	-19.8'	99.1°	21°08.2'	-20.9'	99.5°	20°58.1'	-21.9'	99.9°	20°47.6'	-22.9'	100.2°	2
3	21°27.9'	-17.0'	99.0°	21°18.4'	-18.1'	99.4°	21°08.4'	-19.2'	99.7°	20°58.1'	-20.2'	100.1°	20°47.3'	-21.2'	100.5°	20°36.2'	-22.2'	100.9°	20°24.7'	-23.3'	101.2°	3
4	21°10.9'	-17.4'	100.0°	21°00.3'	-18.5'	100.4°	20°49.3'	-19.5'	100.8°	20°37.9'	-20.5'	101.1°	20°26.1'	-21.6'	101.5°	20°14.0'	-22.6'	101.9°	20°01.4'	-23.6'	102.2°	4
5	20°53.5'	-17.8'	101.0°	20°41.8'	-18.8'	101.4°	20°29.8'	-19.9'	101.8°	20°17.3'	-20.9'	102.1°	20°04.5'	-21.9'	102.5°	19°51.4'	-22.9'	102.8°	19°37.9'	-23.9'	103.2°	5
6	20°35.7'	-18.1'	102.1°	20°23.0'	-19.2'	102.4°	20°09.9'	-20.2'	102.8°	19°56.5'	-21.2'	103.1°	19°42.6'	-22.2'	103.5°	19°28.5'	-23.2'	103.8°	19°14.0'	-24.2'	104.2°	6
7	20°17.6'	-18.5'	103.1°	20°03.8'	-19.5'	103.4°	19°49.7'	-20.5'	103.8°	19°35.2'	-21.5'	104.1°	19°20.4'	-22.5'	104.5°	19°05.3'	-23.5'	104.8°	18°49.8'	-24.5'	105.1°	7
8	19°59.1'	-18.8'	104.1°	19°44.3'	-19.9'	104.4°	19°29.2'	-20.9'	104.8°	19°13.7'	-21.9'	105.1°	18°57.9'	-22.8'	105.4°	18°41.7'	-23.8'	105.8°	18°25.2'	-24.8'	106.1°	8
9	19°40.2'	-19.2'	105.1°	19°24.4'	-20.2'	105.4°	19°08.3'	-21.2'	105.8°	18°51.8'	-22.2'	106.1°	18°35.0'	-23.1'	106.4°	18°17.9'	-24.1'	106.7°	18°00.5'	-25.1'	107.1°	9
10	19°21.1'	-19.5'	106.1°	19°04.3'	-20.5'	106.4°	18°47.1'	-21.5'	106.8°	18°29.7'	-22.5'	107.1°	18°11.9'	-23.4'	107.4°	17°53.8'	-24.4'	107.7°	17°35.4'	-25.3'	108.0°	10
11	19°01.6'	-19.8'	107.1°	18°43.8'	-20.8'	107.4°	18°25.6'	-21.8'	107.7°	18°07.2'	-22.8'	108.1°	17°48.4'	-23.7'	108.4°	17°29.4'	-24.7'	108.7°	17°10.0'	-25.6'	109.0°	11
12	18°41.7'	-20.1'	108.1°	18°22.9'	-21.1'	108.4°	18°03.8'	-22.1'	108.7°	17°44.4'	-23.1'	109.0°	17°24.7'	-24.0'	109.3°	17°04.7'	-24.9'	109.6°	16°44.4'	-25.9'	109.9°	12
13	18°21.6'	-20.4'	109.1°	18°01.8'	-21.4'	109.4°	17°41.7'	-22.4'	109.7°	17°21.4'	-23.3'	110.0°	17°00.7'	-24.3'	110.3°	16°39.8'	-25.2'	110.6°	16°18.5'	-26.1'	110.8°	13
14	18°01.2'	-20.7'	110.1°	17°40.4'	-21.7'	110.4°	17°19.4'	-22.7'	110.7°	16°58.0'	-23.6'	111.0°	16°36.4'	-24.5'	111.2°	16°14.6'	-25.5'	111.5°	15°52.4'	-26.4'	111.8°	14
15	17°40.4'	-21.0'	111.1°	17°18.7'	-22.0'	111.4°	16°56.7'	-22.9'	111.6°	16°34.4'	-23.9'	111.9°	16°11.9'	-24.8'	112.2°	15°49.1'	-25.7'	112.5°	15°26.1'	-26.6'	112.7°	15
16	17°19.4'	-21.3'	112.0°	16°56.7'	-22.3'	112.3°	16°33.8'	-23.2'	112.6°	16°10.6'	-24.1'	112.9°	15°47.1'	-25.0'	113.1°	15°23.4'	-25.9'	113.4°	14°59.5'	-26.8'	113.6°	16
17	16°58.0'	-21.6'	113.0°	16°34.4'	-22.5'	113.3°	16°10.6'	-23.5'	113.6°	15°46.5'	-24.4'	113.8°	15°22.1'	-25.3'	114.1°	14°57.5'	-26.2'	114.3°	14°32.7'	-27.0'	114.6°	17
18	16°36.4'	-21.9'	114.0°	16°11.9'	-22.8'	114.3°	15°47.1'	-23.7'	114.5°	15°22.1'	-24.6'	114.8°	14°56.8'	-25.5'	115.0°	14°31.3'	-26.4'	115.3°	14°05.6'	-27.2'	115.5°	18
19	16°14.6'	-22.1'	115.0°	15°49.1'	-23.0'	115.2°	15°23.4'	-23.9'	115.5°	14°57.5'	-24.8'	115.7°	14°31.3'	-25.7'	116.0°	14°05.0'	-26.6'	116.2°	13°38.4'	-27.4'	116.4°	19
20	15°52.4'	-22.4'	115.9°	15°26.1'	-23.3'	116.2°	14°59.5'	-24.2'	116.4°	14°32.7'	-25.1'	116.7°	14°05.6'	-25.9'	116.9°	13°38.4'	-26.8'	117.1°	13°10.9'	-27.6'</		

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

66° 294° LHA

Latitude CONTRARY to Declination

66° 294° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	23°44.6'	-16.0'	96.1°	23°08.0'	-17.1'	96.6°	23°00.9'	-18.2'	97.0°	22°53.4'	-19.2'	97.4°	22°45.4'	-20.3'	97.8°	22°37.0'	-21.4'	98.2°	22°28.2'	-22.4'	98.7°	0
1	22°58.6'	-16.4'	97.2°	22°50.9'	-17.5'	97.6°	22°42.8'	-18.6'	98.0°	22°34.2'	-19.6'	98.4°	22°25.1'	-20.7'	98.9°	22°15.7'	-21.7'	99.3°	22°05.8'	-22.8'	99.7°	1
2	22°42.2'	-16.8'	98.2°	22°33.4'	-17.9'	98.7°	22°24.2'	-19.0'	99.1°	22°14.5'	-20.0'	99.5°	22°04.5'	-21.1'	99.9°	21°54.0'	-22.1'	100.3°	21°43.1'	-23.1'	100.7°	2
3	22°25.4'	-17.2'	99.3°	22°15.5'	-18.3'	99.7°	22°05.2'	-19.3'	100.1°	21°54.5'	-20.4'	100.5°	21°43.4'	-21.4'	100.9°	21°31.9'	-22.4'	101.3°	21°20.0'	-23.5'	101.7°	3
4	22°08.2'	-17.6'	100.3°	21°57.3'	-18.7'	100.7°	21°45.9'	-19.7'	101.1°	21°34.1'	-20.7'	101.5°	21°22.0'	-21.8'	101.9°	21°09.4'	-22.8'	102.3°	20°56.5'	-23.8'	102.6°	4
5	21°50.6'	-18.0'	101.3°	21°38.6'	-19.0'	101.7°	21°26.2'	-20.1'	102.1°	21°13.4'	-21.1'	102.5°	21°00.2'	-22.1'	102.9°	20°46.6'	-23.1'	103.3°	20°32.7'	-24.1'	103.6°	5
6	21°32.6'	-18.4'	102.4°	21°19.5'	-19.4'	102.8°	21°06.1'	-20.4'	103.1°	20°52.3'	-21.5'	103.5°	20°38.1'	-22.5'	103.9°	20°23.5'	-23.5'	104.2°	20°08.6'	-24.5'	104.6°	6
7	21°14.2'	-18.7'	103.4°	21°00.1'	-19.8'	103.8°	20°45.7'	-20.8'	104.1°	20°30.8'	-21.8'	104.5°	20°15.6'	-22.8'	104.9°	20°00.0'	-23.8'	105.2°	19°44.1'	-24.8'	105.6°	7
8	20°55.5'	-19.1'	104.4°	20°40.4'	-20.1'	104.8°	20°24.9'	-21.1'	105.1°	20°09.0'	-22.1'	105.5°	19°52.8'	-23.1'	105.8°	19°36.3'	-24.1'	106.2°	19°19.4'	-25.1'	106.5°	8
9	20°36.4'	-19.4'	105.4°	20°20.3'	-20.5'	105.8°	20°03.8'	-21.5'	106.1°	19°46.9'	-22.5'	106.5°	19°29.7'	-23.4'	106.8°	19°12.2'	-24.4'	107.2°	18°54.3'	-25.4'	107.5°	9
10	20°17.0'	-19.8'	106.4°	19°59.8'	-20.8'	106.8°	19°42.3'	-21.8'	107.1°	19°24.5'	-22.8'	107.5°	19°06.3'	-23.7'	107.8°	18°47.8'	-24.7'	108.1°	18°28.9'	-25.6'	108.5°	10
11	19°57.2'	-20.1'	107.4°	19°39.0'	-21.1'	107.8°	19°20.5'	-22.1'	108.1°	19°01.7'	-23.1'	108.5°	18°42.5'	-24.0'	108.8°	18°23.1'	-25.0'	109.1°	18°03.3'	-25.9'	109.4°	11
12	19°37.0'	-20.5'	108.4°	19°17.9'	-21.4'	108.8°	18°58.4'	-22.4'	109.1°	18°38.6'	-23.4'	109.4°	18°18.5'	-24.3'	109.7°	17°58.1'	-25.3'	110.0°	17°37.4'	-26.2'	110.4°	12
13	19°16.6'	-20.8'	109.4°	18°56.4'	-21.8'	109.8°	18°36.0'	-22.7'	110.1°	18°15.2'	-23.7'	110.4°	17°54.2'	-24.6'	110.7°	17°32.8'	-25.5'	111.0°	17°11.2'	-26.5'	111.3°	13
14	18°55.8'	-21.1'	110.4°	18°34.7'	-22.1'	110.7°	18°13.3'	-23.0'	111.1°	17°51.6'	-24.0'	111.4°	17°29.6'	-24.9'	111.7°	17°07.3'	-25.8'	111.9°	16°44.7'	-26.7'	112.2°	14
15	18°34.7'	-21.4'	111.4°	18°12.6'	-22.4'	111.7°	17°50.2'	-23.3'	112.0°	17°27.6'	-24.2'	112.3°	17°04.7'	-25.2'	112.6°	16°41.5'	-26.1'	112.9°	16°18.0'	-27.0'	113.2°	15
16	18°13.3'	-21.7'	112.4°	17°50.2'	-22.7'	112.7°	17°26.9'	-23.6'	113.0°	17°03.4'	-24.5'	113.3°	16°39.5'	-25.4'	113.6°	16°15.4'	-26.3'	113.8°	15°51.0'	-27.2'	114.1°	16
17	17°51.6'	-22.0'	113.4°	17°27.6'	-22.9'	113.7°	17°03.4'	-23.9'	114.0°	16°38.9'	-24.8'	114.2°	16°14.1'	-25.7'	114.5°	15°49.1'	-26.5'	114.8°	15°23.8'	-27.4'	115.0°	17
18	17°29.6'	-22.3'	114.4°	17°04.7'	-23.2'	114.6°	16°39.5'	-24.1'	114.9°	16°14.1'	-25.0'	115.2°	15°48.4'	-25.9'	115.4°	15°22.5'	-26.8'	115.7°	14°56.4'	-27.6'	115.9°	18
19	17°07.3'	-22.6'	115.3°	16°41.5'	-23.5'	115.6°	16°15.4'	-24.4'	115.9°	15°49.1'	-25.3'	116.1°	15°22.5'	-26.1'	116.4°	14°55.8'	-27.0'	116.6°	14°28.8'	-27.9'	116.9°	19
20	16°44.7'	-22.8'	116.3°	16°18.0'	-23.7'	116.6°	15°51.0'	-24.6'	116.8°	15°23.8'	-25.5'	117.1°	14°56.4'	-26.4'	117.3°	14°28.8'	-27.2'	117.5°	14°00.9'	-28.1'	117.8°	20
21	16°21.9'	-23.1'	117.3°	15°54.3'	-24.0'	117.5°	15°26.4'	-24.9'	117.8°	14°58.3'	-25.7'	118.0°	14°30.1'	-26.6'	118.2°	14°01.6'	-27.4'	118.5°	13°32.9'	-28.3'	118.7°	21
22	15°58.8'	-23.4'	118.2°	15°30.3'	-24.2'	118.5°	15°01.6'	-25.1'	118.7°	14°32.6'	-25.9'	118.9°	14°03.5'	-26.8'	119.2°	13°34.1'	-27.6'	119.4°	13°04.6'	-28.4'	119.6°	22
23	15°35.4'	-23.6'	119.2°	15°06.0'	-24.5'	119.4°	14°36.5'	-25.3'	119.7°	14°06.7'	-26.2'	119.9°	13°36.7'	-27.0'	120.1°	13°06.5'	-27.8'	120.3°	12°36.2'	-28.6'	120.5°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

66° 294° LHA

Latitude CONTRARY to DECLINATION

66° 294° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

65° 295° LHA

Latitude CONTRARY to Declination

65° 295° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	24°12.5'	-16.1'	96.4°	24°05.6'	-17.2'	96.9°	23°58.2'	-18.3'	97.3°	23°50.3'	-19.4'	97.8°	23°41.9'	-20.5'	98.2°	23°33.2'	-21.5'	98.6°	23°23.9'	-22.6'	99.1°	0
1	23°56.4'	-16.6'	97.5°	23°48.4'	-17.6'	97.9°	23°39.8'	-18.7'	98.4°	23°30.9'	-19.8'	98.8°	23°21.5'	-20.8'	99.2°	23°11.7'	-21.9'	99.6°	23°01.4'	-22.9'	100.1°	1
2	23°39.8'	-17.0'	98.5°	23°30.7'	-18.1'	99.0°	23°21.1'	-19.1'	99.4°	23°11.1'	-20.2'	99.8°	23°00.6'	-21.2'	100.2°	22°49.8'	-22.3'	100.7°	22°38.4'	-23.3'	101.1°	2
3	23°22.9'	-17.4'	99.6°	23°12.6'	-18.5'	100.0°	23°02.0'	-19.5'	100.4°	22°50.9'	-20.6'	100.8°	22°39.4'	-21.6'	101.3°	22°27.5'	-22.7'	101.7°	22°15.1'	-23.7'	102.1°	3
4	23°05.5'	-17.8'	100.6°	22°54.2'	-18.9'	101.0°	22°42.5'	-19.9'	101.5°	22°30.3'	-21.0'	101.9°	22°17.8'	-22.0'	102.3°	22°04.8'	-23.0'	102.7°	21°51.5'	-24.0'	103.1°	4
5	22°47.6'	-18.2'	101.7°	22°35.3'	-19.3'	102.1°	22°22.5'	-20.3'	102.5°	22°09.4'	-21.3'	102.9°	21°55.8'	-22.4'	103.3°	21°41.8'	-23.4'	103.7°	21°27.5'	-24.4'	104.0°	5
6	22°29.4'	-18.6'	102.7°	22°16.0'	-19.6'	103.1°	22°02.2'	-20.7'	103.5°	21°48.0'	-21.7'	103.9°	21°33.4'	-22.7'	104.3°	21°18.5'	-23.7'	104.7°	21°03.1'	-24.7'	105.0°	6
7	22°10.8'	-19.0'	103.7°	21°56.4'	-20.0'	104.1°	21°41.6'	-21.0'	104.5°	21°26.3'	-22.1'	104.9°	21°10.7'	-23.1'	105.3°	20°54.7'	-24.1'	105.6°	20°38.4'	-25.0'	106.0°	7
8	21°51.8'	-19.4'	104.7°	21°36.4'	-20.4'	105.1°	21°20.5'	-21.4'	105.5°	21°04.3'	-22.4'	105.9°	20°47.7'	-23.4'	106.3°	20°30.7'	-24.4'	106.6°	20°13.3'	-25.3'	107.0°	8
9	21°32.5'	-19.7'	105.8°	21°16.0'	-20.7'	106.1°	20°59.1'	-21.8'	106.5°	20°41.9'	-22.7'	106.9°	20°24.3'	-23.7'	107.2°	20°06.3'	-24.7'	107.6°	19°48.0'	-25.7'	107.9°	9
10	21°12.7'	-20.1'	106.8°	20°55.2'	-21.1'	107.2°	20°37.4'	-22.1'	107.5°	20°19.1'	-23.1'	107.9°	20°00.5'	-24.0'	108.2°	19°41.6'	-25.0'	108.6°	19°22.3'	-26.0'	108.9°	10
11	20°52.6'	-20.4'	107.8°	20°34.1'	-21.4'	108.2°	20°15.3'	-22.4'	108.5°	19°56.0'	-23.4'	108.9°	19°36.5'	-24.4'	109.2°	19°16.6'	-25.3'	109.5°	18°56.4'	-26.2'	109.9°	11
12	20°32.2'	-20.8'	108.8°	20°12.7'	-21.8'	109.1°	19°52.8'	-22.8'	109.5°	19°32.6'	-23.7'	109.8°	19°12.1'	-24.7'	110.2°	18°51.3'	-25.6'	110.5°	18°30.1'	-26.5'	110.8°	12
13	20°11.4'	-21.1'	109.8°	19°50.9'	-22.1'	110.1°	19°30.1'	-23.1'	110.5°	19°08.9'	-24.0'	110.8°	18°47.5'	-25.0'	111.1°	18°25.7'	-25.9'	111.4°	18°03.6'	-26.8'	111.7°	13
14	19°50.3'	-21.5'	110.8°	19°28.8'	-22.4'	111.1°	19°07.0'	-23.4'	111.5°	18°44.9'	-24.3'	111.8°	18°22.5'	-25.2'	112.1°	17°59.8'	-26.2'	112.4°	17°36.8'	-27.1'	112.7°	14
15	19°28.8'	-21.8'	111.8°	19°06.4'	-22.7'	112.1°	18°43.6'	-23.7'	112.4°	18°20.6'	-24.6'	112.7°	17°57.3'	-25.5'	113.0°	17°33.6'	-26.4'	113.3°	17°09.7'	-27.3'	113.6°	15
16	19°07.0'	-22.1'	112.8°	18°43.6'	-23.0'	113.1°	18°20.0'	-24.0'	113.4°	17°56.0'	-24.9'	113.7°	17°31.7'	-25.8'	114.0°	17°07.2'	-26.7'	114.3°	16°42.4'	-27.6'	114.6°	16
17	18°44.9'	-22.4'	113.8°	18°20.6'	-23.3'	114.1°	17°56.0'	-24.3'	114.4°	17°31.1'	-25.2'	114.7°	17°05.9'	-26.1'	114.9°	16°40.5'	-26.9'	115.2°	16°14.8'	-27.8'	115.5°	17
18	18°22.5'	-22.7'	114.7°	17°57.3'	-23.6'	115.0°	17°31.7'	-24.5'	115.3°	17°05.9'	-25.4'	115.6°	16°39.9'	-26.3'	115.9°	16°13.6'	-27.2'	116.1°	15°47.0'	-28.0'	116.4°	18
19	17°59.8'	-23.0'	115.7°	17°33.6'	-23.9'	116.0°	17°07.2'	-24.8'	116.3°	16°40.5'	-25.7'	116.5°	16°13.6'	-26.6'	116.8°	15°46.4'	-27.4'	117.1°	15°19.0'	-28.3'	117.3°	19
20	17°36.8'	-23.3'	116.7°	17°09.7'	-24.2'	117.0°	16°42.4'	-25.1'	117.2°	16°14.8'	-25.9'	117.5°	15°47.0'	-26.8'	117.7°	15°19.0'	-27.6'	118.0°	14°50.7			

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

64° 296° LHA

Latitude CONTRARY to Declination

64° 296° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	25°10.3'	-16.3'	96.7°	25°03.1'	-17.4'	97.2°	24°55.3'	-18.5'	97.7°	24°47.1'	-19.5'	98.1°	24°38.4'	-20.6'	98.6°	24°29.2'	-21.7'	99.0°	24°19.6'	-22.7'	99.5°	0
1	24°54.1'	-16.7'	97.8°	24°45.7'	-17.8'	98.3°	24°36.9'	-18.9'	98.7°	24°27.6'	-20.0'	99.2°	24°17.8'	-21.0'	99.6°	24°07.6'	-22.1'	100.0°	23°56.9'	-23.1'	100.5°	1
2	24°37.3'	-17.2'	98.8°	24°27.9'	-18.2'	99.3°	24°18.0'	-19.3'	99.7°	24°07.6'	-20.4'	100.2°	23°56.8'	-21.4'	100.6°	23°45.5'	-22.5'	101.1°	23°33.7'	-23.5'	101.5°	2
3	24°20.2'	-17.6'	99.9°	24°09.7'	-18.7'	100.3°	23°58.7'	-19.7'	100.8°	23°47.2'	-20.8'	101.2°	23°35.3'	-21.8'	101.6°	23°23.0'	-22.9'	102.1°	23°10.2'	-23.9'	102.5°	3
4	24°02.6'	-18.0'	101.0°	23°51.0'	-19.1'	101.4°	23°39.0'	-20.1'	101.8°	23°26.4'	-21.2'	102.2°	23°13.5'	-22.2'	102.7°	23°00.1'	-23.2'	103.1°	22°46.3'	-24.3'	103.5°	4
5	23°44.6'	-18.4'	102.0°	23°31.9'	-19.5'	102.4°	23°18.8'	-20.5'	102.8°	23°05.3'	-21.6'	103.3°	22°51.3'	-22.6'	103.7°	22°36.9'	-23.6'	104.1°	22°22.1'	-24.6'	104.5°	5
6	23°26.2'	-18.8'	103.0°	23°12.4'	-19.9'	103.5°	22°58.3'	-20.9'	103.9°	22°43.7'	-22.0'	104.3°	22°28.7'	-23.0'	104.7°	22°13.3'	-24.0'	105.1°	21°57.5'	-25.0'	105.5°	6
7	23°07.3'	-19.2'	104.1°	22°52.6'	-20.3'	104.5°	22°37.3'	-21.3'	104.9°	22°21.7'	-22.3'	105.3°	22°05.7'	-23.3'	105.7°	21°49.3'	-24.3'	106.1°	21°32.5'	-25.3'	106.4°	7
8	22°48.1'	-19.6'	105.1°	22°32.3'	-20.7'	105.5°	22°16.0'	-21.7'	105.9°	21°59.4'	-22.7'	106.3°	21°42.4'	-23.7'	106.7°	21°25.0'	-24.7'	107.0°	21°07.2'	-25.6'	107.4°	8
9	22°28.5'	-20.0'	106.1°	22°11.6'	-21.0'	106.5°	21°54.3'	-22.0'	106.9°	21°36.7'	-23.0'	107.3°	21°18.7'	-24.0'	107.7°	21°00.3'	-25.0'	108.0°	20°41.6'	-26.0'	108.4°	9
10	22°08.4'	-20.4'	107.1°	21°50.6'	-21.4'	107.5°	21°32.3'	-22.4'	107.9°	21°13.7'	-23.4'	108.3°	20°54.7'	-24.4'	108.6°	20°35.3'	-25.3'	109.0°	20°15.6'	-26.3'	109.3°	10
11	21°48.0'	-20.8'	108.2°	21°29.1'	-21.8'	108.5°	21°09.9'	-22.8'	108.9°	20°50.3'	-23.7'	109.3°	20°30.3'	-24.7'	109.6°	20°10.0'	-25.6'	110.0°	19°49.3'	-26.6'	110.3°	11
12	21°27.2'	-21.1'	109.2°	21°07.4'	-22.1'	109.5°	20°47.1'	-23.1'	109.9°	20°26.6'	-24.1'	110.2°	20°05.6'	-25.0'	110.6°	19°44.4'	-25.9'	110.9°	19°22.8'	-26.9'	111.3°	12
13	21°06.1'	-21.5'	110.2°	20°45.3'	-22.5'	110.5°	20°24.0'	-23.4'	110.9°	20°02.5'	-24.4'	111.2°	19°40.6'	-25.3'	111.6°	19°18.4'	-26.2'	111.9°	18°55.9'	-27.2'	112.2°	13
14	20°44.6'	-21.8'	111.2°	20°22.8'	-22.8'	111.5°	20°00.6'	-23.7'	111.9°	19°38.1'	-24.7'	112.2°	19°15.3'	-25.6'	112.5°	18°52.2'	-26.5'	112.8°	18°28.7'	-27.4'	113.1°	14
15	20°22.8'	-22.2'	112.2°	19°60.0'	-23.1'	112.5°	19°36.9'	-24.1'	112.8°	19°13.4'	-25.0'	113.2°	18°49.7'	-25.9'	113.5°	18°25.6'	-26.8'	113.8°	18°01.3'	-27.7'	114.1°	15
16	20°00.6'	-22.5'	113.1°	19°36.9'	-23.4'	113.5°	19°12.8'	-24.4'	113.8°	18°48.4'	-25.3'	114.1°	18°23.8'	-26.2'	114.4°	17°58.8'	-27.1'	114.7°	17°33.6'	-28.0'	115.0°	16
17	19°38.1'	-22.8'	114.1°	19°13.4'	-23.7'	114.5°	18°48.4'	-24.7'	114.8°	18°23.2'	-25.6'	115.1°	17°57.6'	-26.5'	115.4°	17°31.7'	-27.3'	115.7°	17°05.6'	-28.2'	115.9°	17
18	19°15.3'	-23.1'	115.1°	18°49.7'	-24.0'	115.4°	18°23.8'	-25.0'	115.7°	17°57.6'	-25.8'	116.0°	17°31.1'	-26.7'	116.3°	17°04.4'	-27.6'	116.6°	16°37.4'	-28.5'	116.9°	18
19	18°52.2'	-23.4'	116.1°	18°25.6'	-24.3'	116.4°	17°58.8'	-25.2'	116.7°	17°31.7'	-26.1'	117.0°	17°04.4'	-27.0'	117.3°	16°36.8'	-27.8'	117.5°	16°09.0'	-28.7'	117.8°	19
20	18°28.7'	-23.7'	117.1°	18°01.3'	-24.6'	117.4°	17°33.6'	-25.5'	117.6°	17°05.6'	-26.4'	117.9°	16°37.4'	-27.2'	118.2°	16°09.0'	-28.1'	118.4°	15°40.3'	-28.9'	118.7°	20
21	18°05.0'	-24.0'	118.0°	17°36.7'	-24.9'	118.3°	17°08.1'	-25.8'	118.6°	16°39.3'	-26.6'	118.9°	16°10.2'	-27.5'	119.1°	15°40.9'	-28.3'	119.4°	15°11.3'	-29.1'	119.6°	21
22	17°41.0'	-24.3'	119.0°	17°11.8'	-25.2'	119.3°	16°42.3'	-26.0'	119.5°	16°12.6'	-26.9'	119.8°	15°42.7'	-27.7'	120.0°	15°12.6'	-28.5'	120.3°	14°42.2'	-29.3'	120.5°	22
23	17°16.7'	-24.6'	120.0°	16°46.6'	-25.4'	120.2°	16°16.3'	-26.3'	120.5°	15°45.8'	-27.1'	120.7°	15°15.0'	-27.9'	121.0°	14°44.0'	-28.7'	121.2°	14°12.9'	-29.5'	121.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

64° 296° LHA

Latitude CONTRARY to DECLINATION

64° 296° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

63° 297° LHA

Latitude CONTRARY to Declination

63° 297° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	26°08.1'	-16.4'	97.0°	26°00.6'	-17.5'	97.5°	25°52.5'	-18.6'	98.0°	25°43.9'	-19.7'	98.5°	25°34.8'	-20.8'	98.9°	25°25.2'	-21.8'	99.4°	25°15.2'	-22.9'	99.9°	0
1	25°51.7'	-16.9'	98.1°	25°43.1'	-18.0'	98.6°	25°33.9'	-19.1'	99.0°	25°24.2'	-20.1'	99.5°	25°14.0'	-21.2'	100.0°	25°03.4'	-22.3'	100.4°	24°52.3'	-23.3'	100.9°	1
2	25°34.8'	-17.3'	99.2°	25°25.1'	-18.4'	99.6°	25°14.8'	-19.5'	100.1°	25°04.0'	-20.6'	100.6°	24°52.8'	-21.6'	101.0°	24°41.1'	-22.7'	101.5°	24°29.0'	-23.7'	101.9°	2
3	25°17.6'	-17.8'	100.2°	25°06.7'	-18.9'	100.7°	24°55.3'	-19.9'	101.1°	24°43.5'	-21.0'	101.6°	24°31.2'	-22.0'	102.0°	24°18.4'	-23.1'	102.5°	24°05.2'	-24.1'	102.9°	3
4	24°59.8'	-18.2'	101.3°	24°47.8'	-19.3'	101.7°	24°35.4'	-20.4'	102.2°	24°22.5'	-21.4'	102.6°	24°09.1'	-22.5'	103.1°	23°55.3'	-23.5'	103.5°	23°41.1'	-24.5'	103.9°	4
5	24°41.5'	-18.7'	102.3°	24°28.5'	-19.7'	102.8°	24°15.0'	-20.8'	103.2°	24°01.1'	-21.8'	103.7°	23°46.7'	-22.8'	104.1°	23°31.9'	-23.9'	104.5°	23°16.6'	-24.9'	104.9°	5
6	24°22.9'	-19.1'	103.4°	24°08.8'	-20.1'	103.8°	23°54.2'	-21.2'	104.2°	23°39.2'	-22.2'	104.7°	23°23.8'	-23.2'	105.1°	23°08.0'	-24.2'	105.5°	22°51.8'	-25.2'	105.9°	6
7	24°03.8'	-19.5'	104.4°	23°48.6'	-20.6'	104.8°	23°33.0'	-21.6'	105.3°	23°17.0'	-22.6'	105.7°	23°00.6'	-23.6'	106.1°	22°43.8'	-24.6'	106.5°	22°26.5'	-25.6'	106.9°	7
8	23°44.3'	-19.9'	105.4°	23°28.1'	-21.0'	105.9°	23°11.5'	-22.0'	106.3°	22°54.4'	-23.0'	106.7°	22°37.0'	-24.0'	107.1°	22°19.2'	-25.0'	107.5°	22°00.9'	-25.9'	107.9°	8
9	23°24.3'	-20.3'	106.5°	23°07.1'	-21.3'	106.9°	22°49.5'	-22.4'	107.3°	22°31.4'	-23.4'	107.7°	22°13.0'	-24.3'	108.1°	21°54.2'	-25.3'	108.5°	21°35.0'	-26.3'	108.8°	9
10	23°04.0'	-20.7'	107.5°	22°45.8'	-21.7'	107.9°	22°27.1'	-22.7'	108.3°	22°08.1'	-23.7'	108.7°	21°48.7'	-24.7'	109.1°	21°28.9'	-25.6'	109.4°	21°08.7'	-26.6'	109.8°	10
11	22°43.3'	-21.1'	108.5°	22°24.0'	-22.1'	108.9°	22°04.4'	-23.1'	109.3°	21°44.4'	-24.1'	109.7°	21°24.0'	-25.0'	110.0°	21°03.2'	-26.0'	110.4°	20°42.1'	-26.9'	110.8°	11
12	22°22.2'	-21.5'	109.5°	22°01.9'	-22.5'	109.9°	21°41.3'	-23.4'	110.3°	21°20.3'	-24.4'	110.7°	20°59.0'	-25.4'	111.0°	20°37.3'	-26.3'	111.4°	20°15.2'	-27.2'	111.7°	12
13	22°00.7'	-21.9'	110.5°	21°39.5'	-22.8'	110.9°	21°17.9'	-23.8'	111.3°	20°55.9'	-24.7'	111.6°	20°33.6'	-25.7'	112.0°	20°11.0'	-26.6'	112.3°	19°48.0'	-27.5'	112.7°	13
14	21°38.8'	-22.2'	111.5°	21°16.6'	-23.2'	111.9°	20°54.1'	-24.1'	112.3°	20°31.2'	-25.1'	112.6°	20°07.9'	-26.0'	113.0°	19°44.4'	-26.9'	113.3°	19°20.5'	-27.8'	113.6°	14
15	21°16.6'	-22.6'	112.5°	20°53.5'	-23.5'	112.9°	20°29.9'	-24.5'	113.2°	20°06.1'	-25.4'	113.6°	19°41.9'	-26.3'	113.9°	19°17.5'	-27.2'	114.2°	18°52.7'	-28.1'	114.6°	15
16	20°54.1'	-22.9'	113.5°	20°29.9'	-23.8'	113.9°	20°05.5'	-24.8'	114.2°	19°40.7'	-25.7'	114.5°	19°15.6'	-26.6'	114.9°	18°50.3'	-27.5'	115.2°	18°24.6'	-28.4'	115.5°	16
17	20°31.2'	-23.2'	114.5°	20°06.1'	-24.2'	114.9°	19°40.7'	-25.1'	115.2°	19°15.0'	-26.0'	115.5°	18°49.1'	-26.9'	115.8°	18°22.8'	-27.8'	116.1°	17°56.2'	-28.6'	116.4°	17
18	20°07.9'	-23.6'	115.5°	19°41.9'	-24.5'	115.8°	19°15.6'	-25.4'	116.2°	18°49.1'	-26.3'	116.5°	18°22.2'	-27.2'	116.8°	17°55.0'	-28.0'	117.1°	17°27.6'	-28.9'	117.3°	18
19	19°44.4'	-23.9'	116.5°	19°17.5'	-24.8'	116.8°	18°50.3'	-25.7'	117.1°	18°22.8'	-26.6'	117.4°	17°55.0'	-27.4'	117.7°	17°27.0'	-28.3'	118.0°	16°58.7'	-29.1'	118.3°	19
20	19°20.5'	-24.2'	117.5°	18°52.7'	-25.1'	117.8°	18°24.6'	-26.0'	118.1°	17°56.2'	-26.8'	118.4°	17°27.6'	-27.7'	118.6°	16°58.7'	-28.5'	118.9°				

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

62° 298° LHA

Latitude CONTRARY to Declination

62° 298° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	27°05.9'	-16.6'	97.3°	26°58.0'	-17.7'	97.8°	26°49.6'	-18.8'	98.3°	26°40.6'	-19.9'	98.8°	26°31.1'	-20.9'	99.3°	26°21.2'	-22.0'	99.8°	26°10.7'	-23.1'	100.3°	0
1	26°49.3'	-17.0'	98.4°	26°40.3'	-18.1'	98.9°	26°30.8'	-19.2'	99.4°	26°20.7'	-20.3'	99.9°	26°10.2'	-21.4'	100.4°	25°59.1'	-22.5'	100.9°	25°47.6'	-23.5'	101.3°	1
2	26°32.3'	-17.5'	99.5°	26°22.2'	-18.6'	100.0°	26°11.6'	-19.7'	100.5°	26°00.4'	-20.8'	100.9°	25°48.8'	-21.8'	101.4°	25°36.7'	-22.9'	101.9°	25°24.1'	-23.9'	102.4°	2
3	26°14.8'	-18.0'	100.5°	26°03.6'	-19.1'	101.0°	25°51.9'	-20.2'	101.5°	25°39.6'	-21.2'	102.0°	25°26.9'	-22.3'	102.4°	25°13.8'	-23.3'	102.9°	25°00.1'	-24.3'	103.4°	3
4	25°56.8'	-18.5'	101.6°	25°44.5'	-19.5'	102.1°	25°31.7'	-20.6'	102.6°	25°18.4'	-21.7'	103.0°	25°04.7'	-22.7'	103.5°	24°50.5'	-23.7'	103.9°	24°35.8'	-24.7'	104.4°	4
5	25°38.4'	-18.9'	102.7°	25°25.0'	-20.0'	103.1°	25°11.1'	-21.0'	103.6°	24°56.8'	-22.1'	104.0°	24°42.0'	-23.1'	104.5°	24°26.7'	-24.1'	104.9°	24°11.1'	-25.1'	105.4°	5
6	25°19.5'	-19.4'	103.7°	25°05.0'	-20.4'	104.2°	24°50.1'	-21.5'	104.6°	24°34.7'	-22.5'	105.1°	24°18.9'	-23.5'	105.5°	24°02.6'	-24.5'	105.9°	23°45.9'	-25.5'	106.4°	6
7	25°00.1'	-19.8'	104.8°	24°44.6'	-20.8'	105.2°	24°28.6'	-21.9'	105.7°	24°12.2'	-22.9'	106.1°	23°55.4'	-23.9'	106.5°	23°38.1'	-24.9'	106.9°	23°20.4'	-25.9'	107.4°	7
8	24°40.3'	-20.2'	105.8°	24°23.8'	-21.3'	106.2°	24°06.8'	-22.3'	106.7°	23°49.3'	-23.3'	107.1°	23°31.5'	-24.3'	107.5°	23°13.2'	-25.3'	107.9°	22°54.5'	-26.2'	108.3°	8
9	24°20.1'	-20.6'	106.8°	24°02.5'	-21.7'	107.3°	23°44.5'	-22.7'	107.7°	23°26.0'	-23.7'	108.1°	23°07.2'	-24.7'	108.5°	22°47.9'	-25.6'	108.9°	22°28.3'	-26.6'	109.3°	9
10	23°59.5'	-21.0'	107.9°	23°40.9'	-22.1'	108.3°	23°21.8'	-23.1'	108.7°	23°02.4'	-24.0'	109.1°	22°42.5'	-25.0'	109.5°	22°22.3'	-26.0'	109.9°	22°01.7'	-26.9'	110.3°	10
11	23°38.4'	-21.4'	108.9°	23°18.8'	-22.4'	109.3°	22°58.8'	-23.4'	109.7°	22°38.3'	-24.4'	110.1°	22°17.5'	-25.4'	110.5°	21°56.3'	-26.3'	110.9°	21°34.8'	-27.3'	111.2°	11
12	23°17.0'	-21.8'	109.9°	22°56.4'	-22.8'	110.3°	22°35.3'	-23.8'	110.7°	22°13.9'	-24.8'	111.1°	21°52.2'	-25.7'	111.5°	21°30.0'	-26.7'	111.8°	21°07.5'	-27.6'	112.2°	12
13	22°55.1'	-22.2'	110.9°	22°33.5'	-23.2'	111.3°	22°11.5'	-24.2'	111.7°	21°49.2'	-25.1'	112.1°	21°26.4'	-26.0'	112.4°	21°03.4'	-27.0'	112.8°	20°39.9'	-27.9'	113.1°	13
14	22°32.9'	-22.6'	111.9°	22°10.3'	-23.6'	112.3°	21°47.4'	-24.5'	112.7°	21°24.1'	-25.4'	113.0°	21°00.4'	-26.4'	113.4°	20°36.4'	-27.3'	113.8°	20°12.1'	-28.2'	114.1°	14
15	22°10.3'	-23.0'	112.9°	21°46.8'	-23.9'	113.3°	21°22.9'	-24.9'	113.7°	20°58.6'	-25.8'	114.0°	20°34.0'	-26.7'	114.4°	20°09.1'	-27.6'	114.7°	19°43.9'	-28.5'	115.0°	15
16	21°47.4'	-23.3'	113.9°	21°22.9'	-24.3'	114.3°	20°58.0'	-25.2'	114.6°	20°32.8'	-26.1'	115.0°	20°07.3'	-27.0'	115.3°	19°41.5'	-27.9'	115.6°	19°15.4'	-28.8'	116.0°	16
17	21°24.1'	-23.7'	114.9°	20°58.6'	-24.6'	115.3°	20°32.8'	-25.5'	115.6°	20°06.7'	-26.4'	115.9°	19°40.3'	-27.3'	116.3°	19°13.6'	-28.2'	116.6°	18°46.6'	-29.0'	116.9°	17
18	21°00.4'	-24.0'	115.9°	20°34.0'	-24.9'	116.2°	20°07.3'	-25.8'	116.6°	19°40.3'	-26.7'	116.9°	19°13.0'	-27.6'	117.2°	18°45.4'	-28.4'	117.5°	18°17.6'	-29.3'	117.8°	18
19	20°36.4'	-24.3'	116.9°	20°09.1'	-25.2'	117.2°	19°41.5'	-26.1'	117.5°	19°13.6'	-27.0'	117.9°	18°45.4'	-27.9'	118.2°	18°17.0'	-28.7'	118.5°	17°48.3'	-29.6'	118.7°	19
20	20°12.1'	-24.7'	117.9°	19°43.9'	-25.5'	118.2°	19°15.4'	-26.4'	118.5°	18°46.6'	-27.3'	118.8°	18°17.6'	-28.1'	119.1°	17°48.3'	-29.0'	119.4°	17°18.7'	-29.8'	119.6°	20
21	19°47.4'	-25.0'	118.8°	19°18.3'	-25.8'	119.1°	18°49.0'	-26.7'	119.4°	18°19.3'	-27.6'	119.7°	17°49.4'	-28.4'	120.0°	17°19.3'	-29.2'	120.3°	16°48.9'	-30.0'	120.6°	21
22	19°22.4'	-25.3'	119.8°	18°52.5'	-26.1'	120.1°	18°22.3'	-27.0'	120.4°	17°51.8'	-28.8'	120.7°	17°21.1'	-29.5'	121.2°	16°50.1'	-29.5'	121.2°	16°18.9'	-30.3'	121.5°	22
23	18°57.2'	-25.6'	120.8°	18°26.3'	-26.4'	121.0°	17°55.3'	-27.3'	121.3°	17°24.0'	-28.1'	121.6°	16°52.4'	-28.9'	121.9°	16°20.6'	-29.7'	122.1°	15°48.6'	-30.5'	122.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

62° 298° LHA

Latitude CONTRARY to DECLINATION

62° 298° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

61° 299° LHA

Latitude CONTRARY to Declination

61° 299° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	28°03.6'	-16.7'	97.6°	27°55.4'	-17.8'	98.2°	27°46.6'	-18.9'	98.7°	27°37.3'	-20.0'	99.2°	27°27.4'	-21.1'	99.7°	27°17.0'	-22.2'	100.2°	27°06.1'	-23.3'	100.7°	0
1	27°46.9'	-17.2'	98.7°	27°37.6'	-18.3'	99.2°	27°27.7'	-19.4'	99.8°	27°17.2'	-20.5'	100.3°	27°06.3'	-21.6'	100.8°	26°54.8'	-22.7'	101.3°	26°42.8'	-23.7'	101.8°	1
2	27°29.7'	-17.7'	99.8°	27°19.2'	-18.8'	100.3°	27°08.2'	-19.9'	100.8°	26°56.7'	-21.0'	101.3°	26°44.7'	-22.1'	101.8°	26°32.1'	-23.1'	102.3°	26°19.1'	-24.2'	102.8°	2
3	27°12.0'	-18.2'	100.9°	27°00.4'	-19.3'	101.4°	26°48.3'	-20.4'	101.9°	26°35.7'	-21.4'	102.4°	26°22.6'	-22.5'	102.9°	26°09.0'	-23.6'	103.3°	25°54.9'	-24.6'	103.8°	3
4	26°53.8'	-18.7'	102.0°	26°41.1'	-19.8'	102.4°	26°28.0'	-20.8'	102.9°	26°14.3'	-21.9'	103.4°	26°00.1'	-22.9'	103.9°	25°45.5'	-24.0'	104.4°	25°30.4'	-25.0'	104.8°	4
5	26°35.1'	-19.2'	103.0°	26°21.4'	-20.2'	103.5°	26°07.1'	-21.3'	104.0°	25°52.4'	-22.3'	104.5°	25°37.2'	-23.4'	104.9°	25°21.5'	-24.4'	105.4°	25°05.4'	-25.4'	105.8°	5
6	26°16.0'	-19.6'	104.1°	26°01.1'	-20.7'	104.5°	25°45.8'	-21.7'	105.0°	25°30.1'	-22.8'	105.5°	25°13.8'	-23.8'	105.9°	24°57.1'	-24.8'	106.4°	24°40.0'	-25.8'	106.8°	6
7	25°56.4'	-20.1'	105.1°	25°40.5'	-21.1'	105.6°	25°24.1'	-22.2'	106.1°	25°07.3'	-23.2'	106.5°	24°50.0'	-24.2'	107.0°	24°32.3'	-25.2'	107.4°	24°14.2'	-26.2'	107.8°	7
8	25°36.3'	-20.5'	106.2°	25°19.3'	-21.6'	106.6°	25°01.9'	-22.6'	107.1°	24°44.1'	-23.6'	107.5°	24°25.8'	-24.6'	108.0°	24°07.1'	-25.6'	108.4°	23°48.0'	-26.6'	108.8°	8
9	25°15.8'	-21.0'	107.2°	24°57.8'	-22.0'	107.7°	24°39.4'	-23.0'	108.1°	24°20.5'	-24.0'	108.5°	24°01.2'	-25.0'	109.0°	23°41.5'	-26.0'	109.4°	23°21.4'	-26.9'	109.8°	9
10	24°54.8'	-21.4'	108.2°	24°35.8'	-22.4'	108.7°	24°16.4'	-23.4'	109.1°	23°56.5'	-24.4'	109.5°	23°36.3'	-25.4'	110.0°	23°15.6'	-26.3'	110.4°	22°54.5'	-27.3'	110.8°	10
11	24°33.4'	-21.8'	109.3°	24°13.4'	-22.8'	109.7°	23°53.0'	-23.8'	110.1°	23°32.1'	-24.8'	110.5°	23°10.9'	-25.7'	110.9°	22°49.3'	-26.7'	111.3°	22°27.2'	-27.6'	111.7°	11
12	24°11.7'	-22.2'	110.3°	23°50.6'	-23.2'	110.7°	23°29.2'	-24.2'	111.1°	23°07.4'	-25.1'	111.5°	22°45.2'	-26.1'	111.9°	22°22.6'	-27.0'	112.3°	21°59.6'	-27.9'	112.7°	12
13	23°49.5'	-22.6'	111.3°	23°27.4'	-23.6'	111.7°	23°05.0'	-24.5'	112.1°	22°42.3'	-25.5'	112.5°	22°19.1'	-26.4'	112.9°	21°55.6'	-27.4'	113.3°	21°31.7'	-28.3'	113.6°	13
14	23°26.9'	-23.0'	112.3°	23°03.9'	-24.0'	112.7°	22°40.5'	-24.9'	113.1°	22°16.8'	-25.8'	113.5°	21°52.7'	-26.8'	113.9°	21°28.2'	-27.7'	114.2°	21°03.4'	-28.6'	114.6°	14
15	23°03.9'	-23.4'	113.3°	22°39.9'	-24.3'	113.7°	22°15.6'	-25.3'	114.1°	21°50.9'	-26.2'	114.5°	21°25.9'	-27.1'	114.8°	21°00.5'	-28.0'	115.2°	20°34.8'	-28.9'	115.5°	15
16	22°40.5'	-23.7'	114.3°	22°15.6'	-24.7'	114.7°	21°50.3'	-25.6'	115.1°	21°24.7'	-26.5'	115.4°	20°58.8'	-27.4'	115.8°	20°32.5'	-28.3'	116.1°	20°06.0'	-29.2'	116.5°	16
17	22°16.8'	-24.1'	115.3°	21°50.9'	-25.0'	115.7°	21°24.7'	-25.9'	116.0°	20°58.2'	-26.8'	116.4°	20°31.4'	-27.7'	116.7°	20°04.2'	-28.6'	117.1°	19°36.8'	-29.5'	117.4°	17
18	21°52.7'	-24.4'	116.3°	21°25.9'	-25.4'	116.7°	20°58.8'	-26.3'	117.0°	20°31.4'	-27.1'	117.4°	20°03.7'	-28.0'	117.7°	19°35.6'	-28.9'	118.0°	18°37.3'	-29.7'	118.3°	18
19	21°28.2'	-24.8'	117.3°	21°00.5'	-25.7'	117.6°	20°32.5'	-26.6'	117.8°	20°04.2'	-27.5'	118.3°	19°35.6'	-28.3'	118.6°	19°06.8'	-29.2'	118.9°	18°07.6'	-30.0'	119.2°	19
20	21°03.4'	-25.1'	118.3°	20°34.8'	-26.0'	118.6°	20°06.0'	-26.9'	118.9°	19°36.8'	-27.7'	119.3°	19°07.3'	-28.6'	119.6°	18°37.6'</						

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

60° 300° LHA

Latitude CONTRARY to Declination

60° 300° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	29°01.3'	-16.9'	98.0°	28°52.7'	-18.0'	98.5°	28°43.6'	-19.1'	99.0°	28°33.9'	-20.2'	99.6°	28°23.6'	-21.3'	100.1°	28°12.8'	-22.4'	100.6°	28°01.5'	-23.5'	101.2°	0
1	28°44.4'	-17.4'	99.0°	28°34.7'	-18.5'	99.6°	28°24.5'	-19.6'	100.1°	28°13.7'	-20.7'	100.7°	28°02.3'	-21.8'	101.2°	27°50.4'	-22.9'	101.7°	27°38.0'	-23.9'	102.2°	1
2	28°27.0'	-17.9'	100.1°	28°16.2'	-19.0'	100.7°	28°04.9'	-20.1'	101.2°	27°52.9'	-21.2'	101.7°	27°40.5'	-22.3'	102.2°	27°27.5'	-23.3'	102.7°	27°14.0'	-24.4'	103.2°	2
3	28°09.2'	-18.4'	101.2°	27°57.2'	-19.5'	101.7°	27°44.7'	-20.6'	102.3°	27°31.7'	-21.7'	102.8°	27°18.2'	-22.7'	103.3°	27°04.2'	-23.8'	103.8°	26°49.6'	-24.8'	104.3°	3
4	27°50.7'	-18.9'	102.3°	27°37.7'	-20.0'	102.8°	27°24.1'	-21.1'	103.3°	27°10.0'	-22.2'	103.8°	26°55.5'	-23.2'	104.3°	26°40.4'	-24.2'	104.8°	26°24.8'	-25.3'	105.3°	4
5	27°31.8'	-19.4'	103.4°	27°17.7'	-20.5'	103.9°	27°03.0'	-21.6'	104.4°	26°47.9'	-22.6'	104.9°	26°32.3'	-23.6'	105.3°	26°16.1'	-24.7'	105.8°	25°59.5'	-25.7'	106.3°	5
6	27°12.4'	-19.9'	104.4°	26°57.2'	-21.0'	104.9°	26°41.5'	-22.0'	105.4°	26°25.3'	-23.1'	105.9°	26°08.6'	-24.1'	106.4°	25°51.5'	-25.1'	106.8°	25°33.8'	-26.1'	107.3°	6
7	26°52.5'	-20.4'	105.5°	26°36.2'	-21.4'	106.0°	26°19.5'	-22.5'	106.5°	26°02.2'	-23.5'	106.9°	25°44.5'	-24.5'	107.4°	25°26.4'	-25.5'	107.8°	25°07.8'	-26.5'	108.3°	7
8	26°32.1'	-20.8'	106.5°	26°14.8'	-21.9'	107.0°	25°57.0'	-22.9'	107.5°	25°38.8'	-23.9'	108.0°	25°20.0'	-24.9'	108.4°	25°00.9'	-25.9'	108.9°	24°41.3'	-26.9'	109.3°	8
9	26°11.3'	-21.3'	107.6°	25°53.0'	-22.3'	108.1°	25°34.1'	-23.3'	108.5°	25°14.8'	-24.3'	109.0°	24°55.1'	-25.3'	109.4°	24°35.0'	-26.3'	109.8°	24°14.4'	-27.3'	110.3°	9
10	25°50.1'	-21.7'	108.6°	25°30.7'	-22.7'	109.1°	25°10.8'	-23.7'	109.5°	24°50.5'	-24.7'	110.0°	24°29.8'	-25.7'	110.4°	24°08.7'	-26.7'	110.8°	23°47.1'	-27.6'	111.2°	10
11	25°28.3'	-22.1'	109.7°	25°07.9'	-23.2'	110.1°	24°47.1'	-24.1'	110.6°	24°25.8'	-25.1'	111.0°	24°04.1'	-26.1'	111.4°	23°42.0'	-27.0'	111.8°	23°19.5'	-28.0'	112.2°	11
12	25°06.2'	-22.6'	110.7°	24°44.8'	-23.6'	111.1°	24°22.9'	-24.5'	111.6°	24°00.7'	-25.5'	112.0°	23°38.0'	-26.5'	112.4°	23°15.0'	-27.4'	112.8°	22°51.6'	-28.3'	113.2°	12
13	24°43.6'	-23.0'	111.7°	24°21.2'	-24.0'	112.1°	23°58.4'	-24.9'	112.6°	23°35.2'	-25.9'	113.0°	23°11.6'	-26.8'	113.4°	22°47.6'	-27.7'	113.8°	22°23.2'	-28.6'	114.1°	13
14	24°20.6'	-23.4'	112.7°	23°57.2'	-24.4'	113.1°	23°33.5'	-25.3'	113.6°	23°09.3'	-26.2'	113.9°	22°44.8'	-27.2'	114.3°	22°19.9'	-28.1'	114.7°	21°54.6'	-29.0'	115.1°	14
15	23°57.2'	-23.8'	113.7°	23°32.9'	-24.7'	114.1°	23°08.2'	-25.7'	114.5°	22°43.1'	-26.6'	114.9°	22°17.6'	-27.5'	115.3°	21°51.8'	-28.4'	115.7°	21°25.6'	-29.3'	116.0°	15
16	23°33.5'	-24.2'	114.7°	23°08.2'	-25.1'	115.1°	22°42.5'	-26.0'	115.5°	22°16.5'	-26.9'	115.9°	21°50.1'	-27.8'	116.3°	21°23.4'	-28.7'	116.6°	20°56.3'	-29.6'	117.0°	16
17	23°09.3'	-24.5'	115.7°	22°43.1'	-25.5'	116.1°	22°16.5'	-26.4'	116.5°	21°49.5'	-27.3'	116.9°	21°22.2'	-28.2'	117.2°	20°54.7'	-29.0'	117.6°	20°26.7'	-29.9'	117.9°	17
18	22°44.8'	-24.9'	116.7°	22°17.6'	-25.8'	117.1°	21°50.1'	-26.7'	117.5°	21°22.2'	-27.6'	117.8°	20°54.1'	-28.5'	118.2°	20°25.6'	-29.3'	118.5°	19°56.9'	-30.2'	118.8°	18
19	22°19.9'	-25.3'	117.7°	21°51.8'	-26.2'	118.1°	21°23.4'	-27.0'	118.4°	20°54.7'	-27.9'	118.8°	20°25.6'	-28.8'	119.1°	19°56.3'	-29.6'	119.4°	19°26.7'	-30.4'	119.7°	19
20	21°54.6'	-25.6'	118.7°	21°25.6'	-26.5'	119.0°	20°56.3'	-27.4'	119.4°	20°26.7'	-28.2'	119.7°	19°56.9'	-29.1'	120.0°	19°26.7'	-29.9'	120.3°	18°56.2'	-30.7'	120.6°	20
21	21°29.0'	-25.9'	119.7°	20°59.1'	-26.8'	120.0°	20°29.0'	-27.7'	120.3°	19°58.5'	-28.5'	120.7°	19°27.8'	-29.3'	121.0°	18°56.8'	-30.2'	121.3°	18°25.5'	-31.0'	121.5°	21
22	21°03.0'	-26.3'	120.6°	20°32.3'	-27.1'	121.0°	20°01.3'	-28.0'	121.3°	19°30.0'	-28.8'	121.6°	18°58.5'	-29.6'	121.9°	18°26.6'	-30.4'	122.2°	17°54.6'	-31.2'	122.5°	22
23	20°36.8'	-26.6'	121.6°	20°05.2'	-27.4'	121.9°	19°33.3'	-28.3'	122.2°	19°01.2'	-29.1'	122.5°	18°28.8'	-29.9'	122.8°	17°56.2'	-30.7'	123.1°	17°23.3'	-31.5'	123.3°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

60° 300° LHA

Latitude CONTRARY to DECLINATION

60° 300° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

59° 301° LHA

Latitude CONTRARY to Declination

59° 301° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	29°58.9'	-17.0'	98.3°	29°50.0'	-18.2'	98.8°	29°40.5'	-19.3'	99.4°	29°30.4'	-20.4'	100.0°	29°19.8'	-21.5'	100.5°	29°08.5'	-22.6'	101.1°	28°56.7'	-23.7'	101.6°	0
1	29°41.9'	-17.6'	99.4°	29°31.9'	-18.7'	99.9°	29°21.2'	-19.8'	100.5°	29°10.0'	-20.9'	101.0°	28°58.2'	-22.0'	101.6°	28°45.9'	-23.1'	102.1°	28°33.0'	-24.2'	102.7°	1
2	29°24.3'	-18.1'	100.5°	29°13.2'	-19.2'	101.0°	29°01.4'	-20.3'	101.6°	28°49.1'	-21.4'	102.1°	28°36.2'	-22.5'	102.6°	28°22.8'	-23.6'	103.2°	28°08.9'	-24.6'	103.7°	2
3	29°06.2'	-18.6'	101.6°	28°53.9'	-19.8'	102.1°	28°41.1'	-20.8'	102.6°	28°27.6'	-21.9'	103.2°	28°13.7'	-23.0'	103.7°	27°59.2'	-24.1'	104.2°	27°44.2'	-25.1'	104.7°	3
4	28°47.6'	-19.2'	102.7°	28°34.2'	-20.3'	103.2°	28°20.2'	-21.3'	103.7°	28°05.7'	-22.4'	104.2°	27°50.7'	-23.5'	104.7°	27°35.2'	-24.5'	105.3°	27°19.1'	-25.5'	105.8°	4
5	28°28.4'	-19.7'	103.7°	28°13.9'	-20.8'	104.3°	27°58.9'	-21.8'	104.8°	27°43.3'	-22.9'	105.3°	27°27.2'	-23.9'	105.8°	27°10.7'	-25.0'	106.3°	26°53.6'	-26.0'	106.8°	5
6	28°08.7'	-20.2'	104.8°	27°53.1'	-21.2'	105.3°	27°37.0'	-22.3'	105.8°	27°20.4'	-23.3'	106.3°	27°03.3'	-24.4'	106.8°	26°45.7'	-25.4'	107.3°	26°27.6'	-26.4'	107.8°	6
7	27°48.6'	-20.7'	105.9°	27°31.9'	-21.7'	106.4°	27°14.7'	-22.8'	106.9°	26°57.1'	-23.8'	107.4°	26°38.9'	-24.8'	107.8°	26°20.3'	-25.8'	108.3°	26°01.2'	-26.8'	108.8°	7
8	27°27.9'	-21.1'	106.9°	27°10.2'	-22.2'	107.4°	26°52.0'	-23.2'	107.9°	26°33.3'	-24.2'	108.4°	26°14.1'	-25.2'	108.9°	25°54.5'	-26.2'	109.3°	25°34.4'	-27.2'	109.8°	8
9	27°06.8'	-21.6'	108.0°	26°48.0'	-22.6'	108.5°	26°28.7'	-23.7'	108.9°	26°09.0'	-24.7'	109.4°	25°48.9'	-25.7'	109.9°	25°28.3'	-26.6'	110.3°	25°07.2'	-27.6'	110.8°	9
10	26°45.2'	-22.1'	109.0°	26°25.4'	-23.1'	109.5°	26°05.1'	-24.1'	110.0°	25°44.4'	-25.1'	110.4°	25°23.2'	-26.1'	110.9°	25°01.6'	-27.0'	111.3°	24°39.6'	-28.0'	111.7°	10
11	26°23.1'	-22.5'	110.1°	26°02.3'	-23.5'	110.5°	25°41.0'	-24.5'	111.0°	25°19.3'	-25.5'	111.4°	24°57.2'	-26.5'	111.9°	24°34.6'	-27.4'	112.3°	24°11.6'	-28.3'	112.7°	11
12	26°00.6'	-23.0'	111.1°	25°38.7'	-23.9'	111.6°	25°16.5'	-24.9'	112.0°	24°53.8'	-25.9'	112.4°	24°30.7'	-26.8'	112.9°	24°07.2'	-27.8'	113.3°	23°43.3'	-28.7'	113.7°	12
13	25°37.6'	-23.4'	112.1°	25°14.8'	-24.4'	112.6°	24°51.6'	-25.3'	113.0°	24°27.9'	-26.3'	113.4°	24°03.9'	-27.2'	113.8°	23°39.4'	-28.1'	114.2°	23°14.6'	-29.0'	114.6°	13
14	25°14.2'	-23.8'	113.2°	24°50.4'	-24.8'	113.6°	24°26.2'	-25.7'	114.0°	24°01.6'	-26.6'	114.4°	23°36.6'	-27.6'	114.8°	23°11.3'	-28.5'	115.2°	22°45.6'	-29.4'	115.6°	14
15	24°50.4'	-24.2'	114.2°	24°25.7'	-25.2'	114.6°	24°00.5'	-26.1'	115.0°	23°35.0'	-27.0'	115.4°	23°09.1'	-27.9'	115.8°	22°42.8'	-28.8'	116.2°	22°16.2'	-29.7'	116.5°	15
16	24°26.2'	-24.6'	115.2°	24°00.5'	-25.5'	115.6°	23°34.4'	-26.5'	116.0°	23°08.0'	-27.4'	116.4°	22°41.2'	-28.3'	116.7°	22°14.0'	-29.1'	117.1°	21°46.5'	-30.0'	117.5°	16
17	24°01.6'	-25.0'	116.2°	23°35.0'	-25.9'	116.6°	23°08.0'	-26.8'	117.0°	22°40.6'	-27.7'	117.3°	22°12.9'	-28.6'	117.7°	21°44.8'	-29.5'	118.1°	21°16.5'	-30.3'	118.4°	17
18	23°36.6'	-25.4'	117.2°	23°09.1'	-26.3'	117.5°	22°41.2'	-27.2'	117.9°	22°12.9'	-28.1'	118.3°	21°44.3'	-28.9'	118.6°	21°15.4'	-29.8'	119.0°	20°46.1'	-30.6'	119.3°	18
19	23°11.3'	-25.7'	118.2°	22°42.8'	-26.6'	118.5°	22°14.0'	-27.5'	118.9°	21°44.8'	-28.4'	119.2°	21°15.4'	-29.2'	119.5°	20°45.6'	-30.1'	119.9°	20°15.5'	-30.9'	120.2°	19
20	22°45.6'	-26.1'	119.1°	22°16.2'	-27.0'	119.5°	21°46.5'	-27.8'	119.8°	21°16.5'	-28.7'	120.2°	20°46.1'	-29.5'	120.5°	20°15.5'						

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

58° 302° LHA

Latitude CONTRARY to Declination

58° 302° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	30°56.5'	-17.2'	98.6°	30°47.3'	-18.4'	99.2°	30°37.4'	-19.5'	99.8°	30°26.9'	-20.6'	100.4°	30°15.8'	-21.7'	100.9°	30°04.2'	-22.8'	101.5°	29°51.9'	-23.9'	102.1°	0
1	30°39.3'	-17.8'	99.7°	30°28.9'	-18.9'	100.3°	30°17.9'	-20.0'	100.9°	30°06.3'	-21.2'	101.4°	29°54.1'	-22.3'	102.0°	29°41.3'	-23.3'	102.6°	29°28.0'	-24.4'	103.1°	1
2	30°21.5'	-18.3'	100.8°	30°10.0'	-19.5'	101.4°	29°57.9'	-20.6'	102.0°	29°45.1'	-21.7'	102.5°	29°31.8'	-22.8'	103.1°	29°18.0'	-23.8'	103.6°	29°03.6'	-24.9'	104.2°	2
3	30°03.2'	-18.9'	101.9°	29°50.5'	-20.0'	102.5°	29°37.3'	-21.1'	103.0°	29°23.5'	-22.2'	103.6°	29°09.1'	-23.3'	104.1°	28°54.2'	-24.3'	104.7°	28°38.7'	-25.4'	105.2°	3
4	29°44.3'	-19.4'	103.0°	29°30.5'	-20.5'	103.6°	29°16.2'	-21.6'	104.1°	29°01.3'	-22.7'	104.7°	28°45.8'	-23.7'	105.2°	28°29.8'	-24.8'	105.7°	28°13.3'	-25.8'	106.2°	4
5	29°24.9'	-19.9'	104.1°	29°10.0'	-21.0'	104.6°	28°54.6'	-22.1'	105.2°	28°38.6'	-23.2'	105.7°	28°22.1'	-24.2'	106.2°	28°05.0'	-25.3'	106.8°	27°47.5'	-26.3'	107.3°	5
6	29°05.0'	-20.5'	105.2°	28°49.0'	-21.5'	105.7°	28°32.5'	-22.6'	106.2°	28°15.4'	-23.7'	106.8°	27°57.9'	-24.7'	107.3°	27°39.8'	-25.7'	107.8°	27°21.2'	-26.7'	108.3°	6
7	28°44.5'	-21.0'	106.3°	28°27.4'	-22.0'	106.8°	28°09.9'	-23.1'	107.3°	27°51.8'	-24.1'	107.8°	27°33.2'	-25.1'	108.3°	27°14.1'	-26.1'	108.8°	26°54.5'	-27.1'	109.3°	7
8	28°23.5'	-21.5'	107.3°	28°05.4'	-22.5'	107.8°	27°46.8'	-23.6'	108.3°	27°27.7'	-24.6'	108.8°	27°08.0'	-25.6'	109.3°	26°47.9'	-26.6'	109.8°	26°27.4'	-27.5'	110.3°	8
9	28°02.1'	-22.0'	108.4°	27°42.9'	-23.0'	108.9°	27°23.2'	-24.0'	109.4°	27°03.1'	-25.0'	109.9°	26°42.5'	-26.0'	110.3°	26°21.4'	-27.0'	110.8°	25°59.8'	-27.9'	111.3°	9
10	27°40.1'	-22.4'	109.4°	27°19.9'	-23.4'	109.9°	26°59.2'	-24.5'	110.4°	26°38.1'	-25.4'	110.9°	26°16.4'	-26.4'	111.3°	25°54.4'	-27.4'	111.8°	25°31.9'	-28.3'	112.2°	10
11	27°17.7'	-22.9'	110.5°	26°56.5'	-23.9'	111.0°	26°34.8'	-24.9'	111.4°	26°12.6'	-25.9'	111.9°	25°50.0'	-26.8'	112.3°	25°27.0'	-27.8'	112.8°	25°03.5'	-28.7'	113.2°	11
12	26°54.8'	-23.3'	111.5°	26°32.6'	-24.3'	112.0°	26°09.9'	-25.3'	112.4°	25°46.7'	-26.3'	112.9°	25°23.2'	-27.2'	113.3°	24°59.2'	-28.2'	113.8°	24°34.8'	-29.1'	114.2°	12
13	26°31.5'	-23.8'	112.6°	26°08.2'	-24.8'	113.0°	25°44.6'	-25.7'	113.5°	25°20.5'	-26.7'	113.9°	24°56.0'	-27.6'	114.3°	24°31.0'	-28.5'	114.7°	24°05.7'	-29.4'	115.2°	13
14	26°07.7'	-24.2'	113.6°	25°43.5'	-25.2'	114.0°	25°18.8'	-26.1'	114.5°	24°53.8'	-27.1'	114.9°	24°28.3'	-28.0'	115.3°	24°02.5'	-28.9'	115.7°	23°36.3'	-29.8'	116.1°	14
15	25°43.5'	-24.6'	114.6°	25°18.3'	-25.6'	115.0°	24°52.7'	-26.5'	115.5°	24°26.7'	-27.4'	115.9°	24°00.4'	-28.4'	116.3°	23°33.6'	-29.2'	116.7°	23°06.5'	-30.1'	117.0°	15
16	25°18.8'	-25.0'	115.6°	24°52.7'	-26.0'	116.0°	24°26.2'	-26.9'	116.4°	23°59.3'	-27.3'	117.4°	23°31.5'	-28.2'	117.8°	23°03.3'	-29.0'	118.2°	22°34.8'	-29.9'	118.6°	16
17	24°53.8'	-25.4'	116.6°	24°26.7'	-26.4'	117.0°	23°59.3'	-27.3'	117.4°	23°31.5'	-28.2'	117.8°	23°03.3'	-29.0'	118.2°	22°34.8'	-29.9'	118.6°	22°05.9'	-30.8'	118.9°	17
18	24°28.3'	-25.8'	117.6°	24°00.4'	-26.7'	118.0°	23°32.0'	-27.6'	118.4°	23°03.3'	-28.5'	118.8°	22°34.2'	-29.4'	119.1°	22°04.9'	-30.2'	119.5°	21°35.2'	-31.1'	119.8°	18
19	24°02.5'	-26.2'	118.6°	23°33.6'	-27.1'	119.0°	23°04.4'	-28.0'	119.4°	22°34.8'	-28.9'	119.7°	22°04.9'	-29.7'	120.1°	21°34.6'	-30.5'	120.4°	21°04.1'	-31.4'	120.8°	19
20	23°36.3'	-26.6'	119.6°	23°06.5'	-27.5'	120.0°	22°36.4'	-28.3'	120.3°	22°05.9'	-29.2'	120.7°	21°35.2'	-30.0'	121.0°	21°04.1'	-30.8'	121.4°	20°32.7'	-31.6'	121.7°	20
21	23°09.7'	-27.1'	120.6°	22°39.0'	-27.8'	120.9°	22°08.1'	-28.7'	121.3°	21°36.8'	-29.5'	121.6°	21°05.2'	-30.3'	121.9°	20°33.3'	-31.1'	122.3°	20°01.1'	-31.9'	122.6°	21
22	22°42.8'	-27.3'	121.5°	22°11.2'	-28.1'	121.9°	21°39.4'	-29.0'	122.2°	21°07.3'	-29.8'	122.5°	20°34.8'	-30.6'	122.9°	20°02.1'	-31.4'	123.2°	19°29.2'	-32.2'	123.5°	22
23	22°15.5'	-27.6'	122.5°	21°43.1'	-28.5'	122.8°	21°10.4'	-29.3'	123.2°	20°37.5'	-30.1'	123.5°	20°04.2'	-30.9'	123.8°	19°30.7'	-31.7'	124.1°	18°57.0'	-32.4'	124.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

58° 302° LHA

Latitude CONTRARY to DECLINATION

58° 302° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

57° 303° LHA

Latitude CONTRARY to Declination

57° 303° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	31°54.0'	-17.4'	98.9°	31°44.5'	-18.6'	99.5°	31°34.2'	-19.7'	100.1°	31°23.3'	-20.8'	100.8°	31°11.8'	-21.9'	101.3°	30°59.7'	-23.1'	101.9°	30°47.0'	-24.1'	102.5°	0
1	31°36.6'	-18.0'	100.1°	31°25.9'	-19.1'	100.7°	31°14.5'	-20.3'	101.3°	31°02.5'	-21.4'	101.8°	30°49.9'	-22.5'	102.4°	30°36.7'	-23.6'	103.0°	30°22.9'	-24.7'	103.6°	1
2	31°18.7'	-18.6'	101.2°	31°06.8'	-19.7'	101.8°	30°54.2'	-20.8'	102.4°	30°41.1'	-21.9'	102.9°	30°27.4'	-23.0'	103.5°	30°13.1'	-24.1'	104.1°	29°58.2'	-25.2'	104.6°	2
3	31°00.2'	-19.1'	102.3°	30°47.1'	-20.2'	102.9°	30°33.4'	-21.4'	103.4°	30°19.2'	-22.5'	104.0°	30°04.4'	-23.5'	104.6°	29°49.0'	-24.6'	105.1°	29°33.0'	-25.6'	105.7°	3
4	30°41.0'	-19.7'	103.4°	30°26.8'	-20.8'	104.0°	30°12.1'	-21.9'	104.5°	29°56.7'	-23.0'	105.1°	29°40.8'	-24.0'	105.6°	29°24.4'	-25.1'	106.2°	29°07.4'	-26.1'	106.7°	4
5	30°21.3'	-20.2'	104.5°	30°06.0'	-21.3'	105.0°	29°50.2'	-22.4'	105.6°	29°33.8'	-23.5'	106.2°	29°16.8'	-24.5'	106.7°	28°59.3'	-25.6'	107.2°	28°41.3'	-26.6'	107.8°	5
6	30°01.1'	-20.8'	105.6°	29°44.7'	-21.8'	106.1°	29°27.8'	-22.9'	106.7°	29°10.3'	-24.0'	107.2°	28°52.3'	-25.0'	107.7°	28°33.7'	-26.0'	108.3°	28°14.7'	-27.0'	108.8°	6
7	29°40.3'	-21.3'	106.7°	29°22.9'	-22.4'	107.2°	29°04.9'	-23.4'	107.7°	28°46.3'	-24.4'	108.3°	28°27.3'	-25.5'	108.8°	28°07.7'	-26.5'	109.3°	27°47.7'	-27.5'	109.8°	7
8	29°19.1'	-21.8'	107.7°	29°00.5'	-22.9'	108.3°	28°41.5'	-23.9'	108.8°	28°21.9'	-24.9'	109.3°	28°01.8'	-25.9'	109.8°	27°41.2'	-26.9'	110.3°	27°20.2'	-27.9'	110.8°	8
9	28°57.2'	-22.3'	108.8°	28°37.7'	-23.3'	109.3°	28°17.6'	-24.4'	109.8°	27°57.0'	-25.4'	110.3°	27°35.9'	-26.4'	110.8°	27°14.3'	-27.3'	111.3°	26°52.3'	-28.3'	111.8°	9
10	28°34.9'	-22.8'	109.9°	28°14.3'	-23.8'	110.4°	27°53.2'	-24.8'	110.9°	27°31.6'	-25.8'	111.4°	27°09.5'	-26.8'	111.8°	26°47.0'	-27.8'	112.3°	26°24.0'	-28.7'	112.8°	10
11	28°12.2'	-23.3'	110.9°	27°50.5'	-24.3'	111.4°	27°28.4'	-25.3'	111.9°	27°05.8'	-26.3'	112.4°	26°42.7'	-27.2'	112.8°	26°19.2'	-28.2'	113.3°	25°55.3'	-29.1'	113.7°	11
12	27°48.9'	-23.7'	112.0°	27°26.2'	-24.7'	112.4°	27°03.1'	-25.7'	112.9°	26°39.5'	-26.7'	113.4°	26°15.5'	-27.6'	113.8°	25°51.0'	-28.6'	114.3°	25°26.1'	-29.5'	114.7°	12
13	27°25.1'	-24.2'	113.0°	27°01.5'	-25.2'	113.5°	26°37.4'	-26.1'	113.9°	26°12.8'	-27.1'	114.4°	25°47.9'	-28.0'	114.8°	25°22.5'	-28.9'	115.3°	24°56.7'	-29.9'	115.7°	13
14	27°01.0'	-24.6'	114.0°	26°36.3'	-25.6'	114.5°	26°11.2'	-26.6'	114.9°	25°45.7'	-27.5'	115.4°	25°19.8'	-28.4'	115.8°	24°53.5'	-29.3'	116.2°	24°26.8'	-30.2'	116.6°	14
15	26°36.3'	-25.1'	115.0°	26°10.7'	-26.0'	115.5°	25°44.7'	-27.0'	115.9°	25°18.2'	-27.9'	116.4°	24°51.4'	-28.8'	116.8°	24°24.2'	-29.7'	117.2°	23°56.6'	-30.6'	117.6°	15
16	26°11.2'	-25.5'	116.1°	25°44.7'	-26.4'	116.5°	25°17.7'	-27.4'	116.9°	24°50.4'	-28.3'	117.3°	24°22.6'	-29.2'	117.7°	23°54.5'	-30.0'	118.1°	23°26.0'	-30.9'	118.5°	16
17	25°45.7'	-25.9'	117.1°	25°18.2'	-26.8'	117.5°	24°50.4'	-27.7'	117.9°	24°22.1'	-28.6'	118.3°	23°53.5'	-29.5'	118.7°	23°24.5'	-30.4'	119.1°	22°55.2'	-31.2'	119.5°	17
18	25°19.8'	-26.3'	118.1°	24°51.4'	-27.2'	118.5°	24°22.6'	-28.1'	118.9°	23°53.5'	-29.0'	119.3°	23°24.0'	-29.8'	119.6°	22°54.1'	-30.7'	120.0°	22°23.9'	-31.5'	120.4°	18
19	24°53.5'	-26.7'	119.1°	24°24.2'	-27.6'	119.5°	23°54.5'	-28.5'	119.9°	23°24.5'	-29.3'	120.2°	22°54.1'	-30.2'	120.6°	22°23.4'	-31.0'	120.9°	21°52.4'	-31.8'	121.3°	19
20	24°26.8'	-27.1'	120.0°	23°56.6'	-28.0'	120.4°	23°26.0'	-28.8'	120.8°	22°55.2'	-29.7'	121.2°	22°23.9'	-30.5'	121.5°	21°52.						

North Lat. LHA > 180° ... Zn = Z LHA < 180° .. Zn= 360-Z

56° 304° LHA

Latitude CONTRARY to Declination

56° 304° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	32°51.5'	-17.6'	99.3°	32°41.6'	-18.8'	99.9°	32°30.9'	-19.9'	100.5°	32°19.7'	-21.0'	101.2°	32°07.7'	-22.2'	101.8°	31°55.2'	-23.3'	102.4°	31°42.0'	-24.4'	103.0°	0
1	32°33.9'	-18.2'	100.4°	32°22.8'	-19.4'	101.0°	32°11.0'	-20.5'	101.6°	31°58.6'	-21.6'	102.3°	31°45.6'	-22.7'	102.9°	31°31.9'	-23.8'	103.5°	31°17.6'	-24.9'	104.1°	1
2	32°15.7'	-18.8'	101.5°	32°03.5'	-19.9'	102.1°	31°50.5'	-21.1'	102.8°	31°37.0'	-22.2'	103.4°	31°22.8'	-23.3'	104.0°	31°08.0'	-24.4'	104.5°	30°52.7'	-25.4'	105.1°	2
3	31°57.0'	-19.4'	102.7°	31°43.5'	-20.5'	103.3°	31°29.5'	-21.6'	103.9°	31°14.8'	-22.7'	104.4°	30°59.5'	-23.8'	105.0°	30°43.7'	-24.9'	105.6°	30°27.3'	-25.9'	106.2°	3
4	31°37.6'	-20.0'	103.8°	31°23.0'	-21.1'	104.4°	31°07.8'	-22.2'	104.9°	30°52.1'	-23.3'	105.5°	30°35.7'	-24.3'	106.1°	30°18.8'	-25.4'	106.7°	30°01.3'	-26.4'	107.2°	4
5	31°17.7'	-20.5'	104.9°	31°02.0'	-21.6'	105.5°	30°45.7'	-22.7'	106.0°	30°28.8'	-23.8'	106.6°	30°11.4'	-24.8'	107.2°	29°53.4'	-25.9'	107.7°	29°34.9'	-26.9'	108.3°	5
6	30°57.1'	-21.1'	106.0°	30°40.3'	-22.2'	106.5°	30°23.0'	-23.2'	107.1°	30°05.0'	-24.3'	107.7°	29°46.6'	-25.3'	108.2°	29°27.5'	-26.4'	108.8°	29°08.0'	-27.4'	109.3°	6
7	30°36.1'	-21.6'	107.1°	30°18.2'	-22.7'	107.6°	29°59.7'	-23.7'	108.2°	29°40.7'	-24.8'	108.7°	29°21.2'	-25.8'	109.3°	29°01.2'	-26.8'	109.8°	28°40.6'	-27.8'	110.3°	7
8	30°14.4'	-22.1'	108.1°	29°55.5'	-23.2'	108.7°	29°36.0'	-24.2'	109.2°	29°16.0'	-25.3'	109.8°	28°55.4'	-26.3'	110.3°	28°34.4'	-27.3'	110.8°	28°12.8'	-28.3'	111.3°	8
9	29°52.3'	-22.7'	109.2°	29°32.3'	-23.7'	109.8°	29°11.7'	-24.7'	110.3°	28°50.7'	-25.7'	110.8°	28°29.1'	-26.7'	111.3°	28°07.1'	-27.7'	111.8°	27°44.5'	-28.7'	112.3°	9
10	29°29.6'	-23.2'	110.3°	29°08.6'	-24.2'	110.8°	28°47.0'	-25.2'	111.3°	28°24.9'	-26.2'	111.8°	28°02.4'	-27.2'	112.3°	27°39.4'	-28.2'	112.8°	27°15.9'	-29.1'	113.3°	10
11	29°06.5'	-23.7'	111.3°	28°44.4'	-24.7'	111.9°	28°21.8'	-25.7'	112.4°	27°58.7'	-26.7'	112.9°	27°35.2'	-27.6'	113.3°	27°11.2'	-28.6'	113.8°	26°46.8'	-29.5'	114.3°	11
12	28°42.8'	-24.1'	112.4°	28°19.7'	-25.1'	112.9°	27°56.1'	-26.1'	113.4°	27°32.1'	-27.1'	113.9°	27°07.6'	-28.0'	114.3°	26°42.6'	-29.0'	114.8°	26°17.3'	-29.9'	115.2°	12
13	28°18.7'	-24.6'	113.4°	27°54.6'	-25.6'	113.9°	27°30.0'	-26.6'	114.4°	27°05.0'	-27.5'	114.9°	26°39.5'	-28.4'	115.3°	26°13.7'	-29.4'	115.8°	25°47.4'	-30.3'	116.2°	13
14	27°54.0'	-25.1'	114.5°	27°29.0'	-26.0'	114.9°	27°03.4'	-27.0'	115.4°	26°37.5'	-27.9'	115.9°	26°11.1'	-28.8'	116.3°	25°44.3'	-29.8'	116.7°	25°17.1'	-30.6'	117.2°	14
15	27°29.0'	-25.5'	115.5°	27°02.9'	-26.5'	116.0°	26°36.4'	-27.4'	116.4°	26°09.5'	-28.3'	116.9°	25°42.2'	-29.2'	117.3°	25°14.5'	-30.1'	117.7°	24°46.5'	-31.0'	118.1°	15
16	27°03.4'	-26.0'	116.5°	26°36.4'	-26.9'	117.0°	26°09.0'	-27.8'	117.4°	25°41.2'	-28.7'	117.8°	25°13.0'	-29.6'	118.3°	24°44.4'	-30.5'	118.7°	24°15.5'	-31.3'	119.1°	16
17	26°37.5'	-26.4'	117.5°	26°09.5'	-27.3'	118.0°	25°41.2'	-28.2'	118.4°	25°12.5'	-29.1'	118.8°	24°43.4'	-30.0'	119.2°	24°13.9'	-30.8'	119.6°	23°44.1'	-31.7'	120.0°	17
18	26°11.1'	-26.8'	118.5°	25°42.2'	-27.7'	118.9°	25°13.0'	-28.6'	119.4°	24°43.4'	-29.5'	119.8°	24°13.4'	-30.3'	120.2°	23°43.1'	-31.2'	120.5°	23°12.4'	-32.0'	120.9°	18
19	25°44.3'	-27.2'	119.5°	25°14.5'	-28.1'	119.9°	24°44.4'	-29.0'	120.3°	24°13.9'	-29.8'	120.7°	23°43.1'	-30.7'	121.1°	23°11.9'	-31.5'	121.5°	22°40.5'	-32.3'	121.8°	19
20	25°17.1'	-27.6'	120.5°	24°46.5'	-28.5'	120.9°	24°15.5'	-29.3'	121.3°	23°44.1'	-30.2'	121.7°	23°12.4'	-31.0'	122.0°	22°40.5'	-31.8'	122.4°	22°08.1'	-32.6'	122.8°	20
21	24°49.5'	-28.0'	121.5°	24°18.0'	-28.8'	121.9°	23°46.1'	-29.7'	122.3°	23°14.0'	-30.5'	122.6°	22°41.5'	-31.3'	123.0°	22°08.6'	-32.1'	123.3°	21°35.5'	-32.9'	123.7°	21
22	24°21.5'	-28.3'	122.5°	23°49.2'	-29.2'	122.8°	23°16.5'	-30.0'	123.2°	22°43.5'	-30.8'	123.6°	22°10.1'	-31.6'	123.9°	21°36.5'	-32.4'	124.2°	21°02.6'	-33.2'	124.6°	22
23	23°53.2'	-28.7'	123.4°	23°20.0'	-29.5'	123.8°	22°46.4'	-30.3'	124.1°	22°12.6'	-31.1'	124.5°	21°38.5'	-31.9'	124.8°	21°04.1'	-32.7'	125.1°	20°29.5'	-33.5'	125.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

56° 304° LHA

Latitude CONTRARY to DECLINATION

56° 304° LHA

South Lat. LHA > 180° .. Zn = 180-Z LHA < 180° .. Zn= 180+Z

North Lat. LHA > 180° ... Zn = Z LHA < 180° .. Zn= 360-Z

55° 305° LHA

Latitude CONTRARY to Declination

55° 305° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	33°49.0'	-17.8'	99.6°	33°38.6'	-19.0'	100.3°	33°27.6'	-20.1'	100.9°	33°15.9'	-21.3'	101.6°	33°03.5'	-22.4'	102.2°	32°50.5'	-23.5'	102.8°	32°36.9'	-24.6'	103.5°	0
1	33°31.2'	-18.4'	100.8°	33°19.7'	-19.6'	101.4°	33°07.5'	-20.7'	102.1°	32°54.6'	-21.9'	102.7°	32°41.1'	-23.0'	103.3°	32°27.0'	-24.1'	103.9°	32°12.2'	-25.2'	104.5°	1
2	33°12.7'	-19.0'	101.9°	33°00.1'	-20.2'	102.5°	32°46.7'	-21.3'	103.2°	32°32.8'	-22.4'	103.8°	32°18.1'	-23.6'	104.4°	32°02.9'	-24.6'	105.0°	31°47.0'	-25.7'	105.6°	2
3	32°53.8'	-19.6'	103.0°	32°39.9'	-20.8'	103.7°	32°25.4'	-21.9'	104.3°	32°10.3'	-23.0'	104.9°	31°54.6'	-24.1'	105.5°	31°38.3'	-25.2'	106.1°	31°21.3'	-26.2'	106.7°	3
4	32°34.1'	-20.2'	104.2°	32°19.1'	-21.4'	104.8°	32°03.5'	-22.5'	105.4°	31°47.3'	-23.6'	106.0°	31°30.5'	-24.6'	106.6°	31°13.1'	-25.7'	107.2°	30°55.1'	-26.7'	107.7°	4
5	32°13.9'	-20.8'	105.3°	31°57.8'	-21.9'	105.9°	31°41.0'	-23.0'	106.5°	31°23.7'	-24.1'	107.1°	31°05.8'	-25.2'	107.6°	30°47.4'	-26.2'	108.2°	30°28.4'	-27.2'	108.8°	5
6	31°53.0'	-21.4'	106.4°	31°35.8'	-22.5'	107.0°	31°18.0'	-23.6'	107.6°	30°59.6'	-24.6'	108.1°	30°40.7'	-25.7'	108.7°	30°21.2'	-26.7'	109.3°	30°01.1'	-27.7'	109.8°	6
7	31°31.6'	-22.0'	107.5°	31°13.3'	-23.0'	108.1°	30°54.5'	-24.1'	108.6°	30°35.0'	-25.1'	109.2°	30°15.0'	-26.2'	109.7°	29°54.5'	-27.2'	110.3°	29°33.4'	-28.2'	110.8°	7
8	31°09.7'	-22.5'	108.6°	30°50.3'	-23.6'	109.1°	30°30.4'	-24.6'	109.7°	30°09.9'	-25.6'	110.2°	29°48.8'	-26.7'	110.8°	29°27.3'	-27.6'	111.3°	29°05.2'	-28.6'	111.8°	8
9	30°47.2'	-23.0'	109.6°	30°26.7'	-24.1'	110.2°	30°05.8'	-25.1'	110.7°	29°44.2'	-26.1'	111.3°	29°22.2'	-27.1'	111.8°	28°59.6'	-28.1'	112.3°	28°36.6'	-29.1'	112.8°	9
10	30°24.2'	-23.6'	110.7°	30°02.7'	-24.6'	111.3°	29°40.6'	-25.6'	111.8°	29°18.1'	-26.6'	112.3°	28°55.1'	-27.6'	112.8°	28°31.5'	-28.5'	113.3°	28°07.5'	-29.5'	113.8°	10
11	30°00.6'	-24.1'	111.8°	29°38.1'	-25.1'	112.3°	29°15.0'	-26.1'	112.8°	28°51.5'	-27.1'	113.3°	28°27.5'	-28.0'	113.8°	28°03.0'	-29.0'	114.3°	27°38.0'	-29.9'	114.8°	11
12	29°36.5'	-24.6'	112.8°	29°13.0'	-25.6'	113.4°	28°49.0'	-26.5'	113.9°	28°24.5'	-27.5'	114.4°	27°59.5'	-28.5'	114.9°	27°34.0'	-29.4'	115.3°	27°08.1'	-30.3'	115.8°	12
13	29°12.0'	-25.0'	113.9°	28°47.4'	-26.0'	114.4°	28°22.4'	-27.0'	114.9°	27°56.9'	-27.9'	115.4°	27°31.0'	-28.9'	115.8°	27°04.6'	-29.8'	116.3°	26°37.8'	-30.7'	116.8°	13
14	28°46.9'	-25.5'	114.9°	28°21.4'	-26.5'	115.4°	27°55.4'	-27.4'	115.9°	27°29.0'	-28.4'	116.4°	27°02.1'	-29.3'	116.8°	26°34.8'	-30.2'	117.3°	26°07.1'	-31.1'	117.7°	14
15	28°21.4'	-26.0'	116.0°	27°54.9'	-26.9'	116.4°	27°28.0'	-27.9'	116.9°	27°00.6'	-28.8'	117.4°	26°32.8'	-29.7'	117.8°	26°04.6'	-30.6'	118.2°	25°36.0'	-31.4'	118.7°	15
16	27°55.4'	-26.4'	117.0°	27°28.0'	-27.4'	117.4°	27°00.1'	-28.3'	117.9°	26°31.8'	-29.2'	118.3°	26°03.2'	-30.1'	118.8°	25°34.1'	-30.9'	119.2°	25°04.6'	-31.8'	119.6°	16
17	27°29.0'	-26.9'	118.0°	27°00.6'	-27.8'	118.4°	26°31.8'	-28.7'	118.9°	26°02.7'	-29.6'	119.3°	25°33.1'	-30.4'	119.7°	25°03.1'	-31.3'	120.2°	24°32.8'	-32.1'	120.5°	17
18	27°02.1'	-27.3'	119.0°	26°32.8'	-28.2'	119.4°	26°03.2'	-29.1'	119.9°	25°33.1'	-30.0'	120.3°	25°02.6'	-30.8'	120.7°	24°31.8'	-31.6'	121.1°	24°00.7'	-32.5'	121.5°	18
19	26°34.8'	-27.7'	120.0°	26°04.6'	-28.6'	120.4°	25°34.1'	-29.5'	120.8°	25°03.1'	-30.3'	121.2°	24°31.8'	-31.2'	121.6°	24°00.2'	-32.0'	122.0°	23°28.2'	-32.8'	122.4°	19
20	26°07.1'	-28.1'	121.0°	25°36.0'	-29.0'	121.4°	25°04.6'	-29.8'	121.8°	24°32.8'	-30.7'	122.2°	24°00.7'	-31.5'	122.6°	23°28.2'						

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

54° 306° LHA

Latitude CONTRARY to Declination

54° 306° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	34°46.3'	-18.0'	100.0°	34°35.6'	-19.2'	100.6°	34°24.2'	-20.4'	101.3°	34°12.1'	-21.5'	102.0°	33°59.3'	-22.7'	102.7°	33°45.8'	-23.8'	103.3°	33°31.7'	-24.9'	104.0°	0
1	34°28.3'	-18.7'	101.1°	34°16.4'	-19.8'	101.8°	34°03.8'	-21.0'	102.5°	33°50.6'	-22.1'	103.1°	33°36.6'	-23.3'	103.8°	33°22.0'	-24.4'	104.4°	33°06.7'	-25.5'	105.0°	1
2	34°09.7'	-19.3'	102.3°	33°56.6'	-20.5'	102.9°	33°42.9'	-21.6'	103.6°	33°28.4'	-22.7'	104.2°	33°13.4'	-23.8'	104.9°	32°57.6'	-24.9'	105.5°	32°41.3'	-26.0'	106.1°	2
3	33°50.4'	-19.9'	103.4°	33°36.2'	-21.1'	104.1°	33°21.3'	-22.2'	104.7°	33°05.7'	-23.3'	105.3°	32°49.5'	-24.4'	106.0°	32°32.7'	-25.5'	106.6°	32°15.3'	-26.5'	107.2°	3
4	33°30.5'	-20.5'	104.6°	33°15.1'	-21.7'	105.2°	32°59.1'	-22.8'	105.8°	32°42.4'	-23.9'	106.4°	32°25.1'	-25.0'	107.1°	32°07.2'	-26.0'	107.7°	31°48.7'	-27.1'	108.2°	4
5	33°10.0'	-21.1'	105.7°	32°53.4'	-22.2'	106.3°	32°36.3'	-23.3'	106.9°	32°18.5'	-24.4'	107.5°	32°00.2'	-25.5'	108.1°	31°41.2'	-26.5'	108.7°	31°21.7'	-27.6'	109.3°	5
6	32°48.8'	-21.7'	106.8°	32°31.2'	-22.8'	107.4°	32°12.9'	-23.9'	108.0°	31°54.1'	-25.0'	108.6°	31°34.7'	-26.0'	109.2°	31°14.6'	-27.1'	109.8°	30°54.1'	-28.1'	110.3°	6
7	32°27.1'	-22.3'	107.9°	32°08.4'	-23.4'	108.5°	31°49.0'	-24.4'	109.1°	31°29.1'	-25.5'	109.7°	31°08.6'	-26.5'	110.2°	30°47.6'	-27.5'	110.8°	30°26.0'	-28.5'	111.4°	7
8	32°04.8'	-22.9'	109.0°	31°45.0'	-23.9'	109.6°	31°24.6'	-25.0'	110.2°	31°03.6'	-26.0'	110.7°	30°42.1'	-27.0'	111.3°	30°20.1'	-28.0'	111.8°	29°57.5'	-29.0'	112.4°	8
9	31°41.9'	-23.4'	110.1°	31°21.1'	-24.5'	110.7°	30°59.6'	-25.5'	111.2°	30°37.6'	-26.5'	111.8°	30°15.1'	-27.5'	112.3°	29°52.0'	-28.5'	112.9°	29°28.5'	-29.5'	113.4°	9
10	31°18.5'	-24.0'	111.2°	30°56.6'	-25.0'	111.7°	30°34.1'	-26.0'	112.3°	30°11.1'	-27.0'	112.8°	29°47.6'	-28.0'	113.4°	29°23.5'	-29.0'	113.9°	28°59.0'	-29.9'	114.4°	10
11	30°54.6'	-24.5'	112.2°	30°31.6'	-25.5'	112.8°	30°08.1'	-26.5'	113.3°	29°44.1'	-27.5'	113.9°	29°19.6'	-28.4'	114.4°	28°54.6'	-29.4'	114.9°	28°29.1'	-30.3'	115.4°	11
12	30°30.1'	-25.0'	113.3°	30°06.1'	-26.0'	113.8°	29°41.6'	-27.0'	114.4°	29°16.6'	-27.9'	114.9°	28°51.1'	-28.9'	115.4°	28°25.2'	-29.8'	115.9°	27°58.8'	-30.7'	116.4°	12
13	30°05.1'	-25.5'	114.4°	29°40.1'	-26.5'	114.9°	29°14.6'	-27.4'	115.4°	28°48.7'	-28.4'	115.9°	28°22.2'	-29.3'	116.4°	27°55.4'	-30.2'	116.9°	27°28.0'	-31.1'	117.3°	13
14	29°39.6'	-26.0'	115.4°	29°13.6'	-26.9'	115.9°	28°47.2'	-27.9'	116.4°	28°20.3'	-28.8'	116.9°	27°52.9'	-29.7'	117.4°	27°25.1'	-30.6'	117.8°	26°56.9'	-31.5'	118.3°	14
15	29°13.6'	-26.4'	116.4°	28°46.7'	-27.4'	116.9°	28°19.3'	-28.3'	117.4°	27°51.5'	-29.2'	117.9°	27°23.2'	-30.1'	118.3°	26°54.5'	-31.0'	118.8°	26°25.4'	-31.9'	119.2°	15
16	28°47.2'	-26.9'	117.5°	28°19.3'	-27.8'	117.9°	27°51.0'	-28.8'	118.4°	27°22.2'	-29.7'	118.9°	26°53.0'	-30.5'	119.3°	26°23.5'	-31.4'	119.8°	25°53.5'	-32.3'	120.2°	16
17	28°20.3'	-27.4'	118.5°	27°51.5'	-28.3'	118.9°	27°22.2'	-29.2'	119.4°	26°52.6'	-30.1'	119.8°	26°22.5'	-30.9'	120.3°	25°52.0'	-31.8'	120.7°	25°21.2'	-32.6'	121.1°	17
18	27°52.9'	-27.8'	119.5°	27°23.2'	-28.7'	119.9°	26°53.0'	-29.6'	120.4°	26°22.5'	-30.4'	120.8°	25°51.6'	-31.3'	121.2°	25°20.3'	-32.1'	121.6°	24°48.6'	-33.0'	122.0°	18
19	27°25.1'	-28.2'	120.5°	26°54.5'	-29.1'	120.9°	26°23.5'	-30.0'	121.4°	25°52.0'	-30.8'	121.8°	25°20.3'	-31.7'	122.2°	24°48.1'	-32.5'	122.6°	24°15.7'	-33.3'	123.0°	19
20	26°56.9'	-28.6'	121.5°	26°25.4'	-29.5'	121.9°	25°53.5'	-30.4'	122.3°	25°21.2'	-31.2'	122.7°	24°48.6'	-32.0'	123.1°	24°15.7'	-32.8'	123.5°	23°42.4'	-33.6'	123.9°	20
21	26°28.3'	-29.0'	122.5°	25°55.9'	-29.9'	122.9°	25°23.1'	-30.7'	123.3°	24°50.0'	-31.5'	123.7°	24°16.6'	-32.3'	124.0°	23°42.9'	-33.1'	124.4°	22°30.8'	-33.9'	124.8°	21
22	25°59.2'	-29.4'	123.4°	25°26.0'	-30.3'	123.8°	24°52.4'	-31.1'	124.2°	24°18.5'	-31.9'	124.6°	23°44.3'	-32.7'	125.0°	23°09.7'	-33.4'	125.3°	22°04.9'	-34.2'	125.7°	22
23	25°29.8'	-29.8'	124.4°	24°55.7'	-30.6'	124.8°	24°21.3'	-31.4'	125.2°	23°46.6'	-32.2'	125.5°	23°11.6'	-33.0'	125.9°	22°36.3'	-33.7'	126.2°	22°00.7'	-34.5'	126.6°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			Dec°

54° 306° LHA

Latitude CONTRARY to DECLINATION

54° 306° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

53° 307° LHA

Latitude CONTRARY to Declination

53° 307° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	35°43.6'	-18.2'	100.3°	35°32.6'	-19.4'	101.0°	35°20.7'	-20.6'	101.7°	35°08.2'	-21.8'	102.4°	34°54.9'	-22.9'	103.1°	34°40.9'	-24.1'	103.8°	34°26.3'	-25.2'	104.5°	0
1	35°25.4'	-18.9'	101.5°	35°13.1'	-20.1'	102.2°	35°00.1'	-21.2'	102.9°	34°46.4'	-22.4'	103.6°	34°32.0'	-23.5'	104.2°	34°16.9'	-24.7'	104.9°	34°01.1'	-25.8'	105.6°	1
2	35°06.5'	-19.6'	102.7°	34°53.1'	-20.7'	103.3°	34°38.9'	-21.9'	104.0°	34°24.0'	-23.0'	104.7°	34°08.4'	-24.1'	105.3°	33°52.2'	-25.2'	106.0°	33°35.4'	-26.3'	106.6°	2
3	34°47.0'	-20.2'	103.8°	34°32.3'	-21.4'	104.5°	34°17.0'	-22.5'	105.2°	34°01.0'	-23.6'	105.8°	33°44.3'	-24.7'	106.5°	33°27.0'	-25.8'	107.1°	33°09.1'	-26.9'	107.7°	3
4	34°26.8'	-20.8'	105.0°	34°11.0'	-22.0'	105.6°	33°54.5'	-23.1'	106.3°	33°37.4'	-24.2'	106.9°	33°19.6'	-25.3'	107.5°	33°01.2'	-26.4'	108.2°	32°42.2'	-27.4'	108.8°	4
5	34°06.0'	-21.5'	106.1°	33°49.0'	-22.6'	106.7°	33°31.4'	-23.7'	107.4°	33°13.2'	-24.8'	108.0°	32°54.3'	-25.8'	108.6°	32°34.8'	-26.9'	109.2°	32°14.8'	-27.9'	109.8°	5
6	33°44.5'	-22.1'	107.2°	33°26.4'	-23.2'	107.9°	33°07.7'	-24.3'	108.5°	32°48.4'	-25.3'	109.1°	32°28.5'	-26.4'	109.7°	32°07.9'	-27.4'	110.3°	31°46.9'	-28.4'	110.9°	6
7	33°22.4'	-22.7'	108.3°	33°03.3'	-23.7'	109.0°	32°43.5'	-24.8'	109.6°	32°23.1'	-25.9'	110.2°	32°02.1'	-26.9'	110.8°	31°40.5'	-27.9'	111.3°	31°18.4'	-28.9'	111.9°	7
8	32°59.8'	-23.2'	109.4°	32°39.5'	-24.3'	110.1°	32°18.6'	-25.4'	110.6°	31°57.2'	-26.4'	111.2°	31°35.2'	-27.4'	111.8°	31°12.6'	-28.4'	112.4°	30°49.5'	-29.4'	112.9°	8
9	32°36.5'	-23.8'	110.5°	32°15.2'	-24.9'	111.1°	31°53.3'	-25.9'	111.7°	31°30.8'	-26.9'	112.3°	31°07.8'	-27.9'	112.9°	30°44.2'	-28.9'	113.4°	30°20.1'	-29.9'	113.9°	9
10	32°12.7'	-24.4'	111.6°	31°50.3'	-25.4'	112.2°	31°27.4'	-26.4'	112.8°	31°03.9'	-27.4'	113.3°	30°39.8'	-28.4'	113.9°	30°15.3'	-29.4'	114.4°	29°50.2'	-30.3'	114.9°	10
11	31°48.4'	-24.9'	112.7°	31°24.9'	-25.9'	113.3°	31°01.0'	-26.9'	113.8°	30°36.5'	-27.9'	114.4°	30°11.4'	-28.9'	114.9°	29°45.9'	-29.8'	115.4°	29°19.9'	-30.7'	115.9°	11
12	31°23.5'	-25.4'	113.8°	30°59.0'	-26.4'	114.3°	30°34.0'	-27.4'	114.9°	30°08.6'	-28.4'	115.4°	29°42.6'	-29.3'	115.9°	29°16.1'	-30.3'	116.4°	28°49.2'	-31.2'	116.9°	12
13	30°58.0'	-25.9'	114.8°	30°32.6'	-26.9'	115.4°	30°06.6'	-27.9'	115.9°	29°40.2'	-28.8'	116.4°	29°13.2'	-29.8'	116.9°	28°45.9'	-30.7'	117.4°	28°18.0'	-31.6'	117.9°	13
14	30°32.1'	-26.4'	115.9°	30°05.7'	-27.4'	116.4°	29°38.7'	-28.4'	116.9°	29°11.3'	-29.3'	117.4°	28°43.5'	-30.2'	117.9°	28°15.2'	-31.1'	118.4°	27°46.4'	-32.0'	118.9°	14
15	30°05.7'	-26.9'	116.9°	29°38.3'	-27.9'	117.4°	29°10.4'	-28.8'	117.9°	28°42.1'	-29.7'	118.4°	28°13.3'	-30.6'	118.9°	27°44.1'	-31.5'	119.4°	27°14.4'	-32.4'	119.8°	15
16	29°38.7'	-27.4'	118.0°	29°10.4'	-28.3'	118.5°	28°41.6'	-29.2'	118.9°	28°12.3'	-30.1'	119.4°	27°42.7'	-31.0'	119.9°	27°12.6'	-31.9'	120.3°	26°42.1'	-32.7'	120.8°	16
17	29°11.3'	-27.9'	119.0°	28°42.1'	-28.8'	119.5°	28°12.3'	-29.7'	119.9°	27°42.2'	-30.6'	120.4°	27°11.6'	-31.4'	120.8°	26°40.7'	-32.3'	121.3°	26°09.3'	-33.1'	121.7°	17
18	28°43.5'	-28.3'	120.0°	28°13.3'	-29.2'	120.5°	27°42.7'	-30.1'	121.0°	27°11.6'	-31.0'	121.4°	26°40.2'	-31.8'	121.8°	26°08.4'	-32.6'	122.2°	25°36.3'	-33.4'	122.6°	18
19	28°15.2'	-28.7'	121.0°	27°44.1'	-29.6'	121.4°	27°12.6'	-30.5'	121.9°	26°40.7'	-31.3'	122.3°	26°08.4'	-32.2'	122.7°	25°35.8'	-33.0'	123.1°	25°02.8'	-33.8'	123.5°	19
20	27°46.4'	-29.2'	122.0°	27°14.4'	-30.0'	122.4°	26°42.1'	-30.9'	122.9°	26°09.3'	-31.7'	123.3°	25°36.3'	-32.5'	123.7°							

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

52° 308° LHA

Latitude CONTRARY to Declination

52° 308° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	36°40.9'	-18.5'	100.7°	36°29.4'	-19.7'	101.4°	36°17.1'	-20.9'	102.2°	36°04.1'	-22.0'	102.9°	35°50.4'	-23.2'	103.6°	35°36.0'	-24.3'	104.3°	35°20.8'	-25.5'	105.0°	0
1	36°22.4'	-19.1'	101.9°	36°09.7'	-20.3'	102.6°	35°56.3'	-21.5'	103.3°	35°42.1'	-22.7'	104.0°	35°27.2'	-23.8'	104.7°	35°11.6'	-25.0'	105.4°	34°55.4'	-26.1'	106.1°	1
2	36°03.3'	-19.8'	103.1°	35°49.4'	-21.0'	103.8°	35°34.8'	-22.2'	104.5°	35°19.4'	-23.3'	105.2°	35°03.4'	-24.4'	105.8°	34°46.7'	-25.5'	106.5°	34°29.3'	-26.6'	107.2°	2
3	35°43.5'	-20.5'	104.2°	35°28.4'	-21.7'	104.9°	35°12.6'	-22.8'	105.6°	34°56.1'	-23.9'	106.3°	34°39.0'	-25.0'	106.9°	34°21.1'	-26.1'	107.6°	34°02.7'	-27.2'	108.2°	3
4	35°23.0'	-21.2'	105.4°	35°06.7'	-22.3'	106.1°	34°49.8'	-23.4'	106.7°	34°32.2'	-24.5'	107.4°	34°13.9'	-25.6'	108.0°	33°55.0'	-26.7'	108.7°	33°35.5'	-27.8'	109.3°	4
5	35°01.8'	-21.8'	106.5°	34°44.4'	-22.9'	107.2°	34°26.4'	-24.0'	107.9°	34°07.7'	-25.1'	108.5°	33°48.3'	-26.2'	109.1°	33°28.3'	-27.3'	109.8°	33°07.7'	-28.3'	110.4°	5
6	34°40.1'	-22.4'	107.7°	34°21.5'	-23.5'	108.3°	34°02.3'	-24.6'	109.0°	33°42.5'	-25.7'	109.6°	33°22.1'	-26.8'	110.2°	33°01.1'	-27.8'	110.8°	32°39.4'	-28.8'	111.4°	6
7	34°17.6'	-23.0'	108.8°	33°58.0'	-24.1'	109.4°	33°37.7'	-25.2'	110.1°	33°16.8'	-26.3'	110.7°	32°55.4'	-27.3'	111.3°	32°33.3'	-28.3'	111.9°	32°10.6'	-29.3'	112.5°	7
8	33°54.6'	-23.6'	109.9°	33°33.9'	-24.7'	110.5°	33°12.5'	-25.8'	111.1°	32°50.6'	-26.8'	111.8°	32°28.1'	-27.8'	112.3°	32°05.0'	-28.8'	112.9°	31°41.3'	-29.8'	113.5°	8
9	33°31.0'	-24.2'	111.0°	33°09.2'	-25.3'	111.6°	32°46.8'	-26.3'	112.2°	32°23.8'	-27.3'	112.8°	32°00.2'	-28.3'	113.4°	31°36.1'	-29.3'	114.0°	31°11.5'	-30.3'	114.5°	9
10	33°06.8'	-24.8'	112.1°	32°43.9'	-25.8'	112.7°	32°20.5'	-26.8'	113.3°	31°56.5'	-27.8'	113.9°	31°31.9'	-28.8'	114.4°	31°06.8'	-29.8'	115.0°	30°41.2'	-30.7'	115.5°	10
11	32°42.0'	-25.3'	113.2°	32°18.1'	-26.4'	113.8°	31°53.6'	-27.4'	114.3°	31°28.6'	-28.3'	114.9°	31°03.1'	-29.3'	115.5°	30°37.0'	-30.3'	116.0°	30°10.5'	-31.2'	116.5°	11
12	32°16.7'	-25.9'	114.3°	31°51.7'	-26.9'	114.8°	31°26.3'	-27.9'	115.4°	31°00.3'	-28.8'	115.9°	30°33.8'	-29.8'	116.5°	30°06.8'	-30.7'	117.0°	29°39.3'	-31.6'	117.5°	12
13	31°50.8'	-26.4'	115.3°	31°24.8'	-27.4'	115.9°	30°58.4'	-28.4'	116.4°	30°31.4'	-29.3'	117.0°	30°04.0'	-30.2'	117.5°	29°36.1'	-31.1'	118.0°	29°07.7'	-32.0'	118.5°	13
14	31°24.4'	-26.9'	116.4°	30°57.5'	-27.9'	116.9°	30°30.0'	-28.8'	117.5°	30°02.1'	-29.8'	118.0°	29°33.8'	-30.7'	118.5°	29°04.9'	-31.6'	119.0°	28°35.7'	-32.4'	119.4°	14
15	30°57.5'	-27.4'	117.4°	30°29.6'	-28.4'	118.0°	30°01.2'	-29.3'	118.5°	29°32.4'	-30.2'	119.0°	29°03.1'	-31.1'	119.5°	28°33.4'	-32.0'	119.9°	28°03.2'	-32.8'	120.4°	15
16	30°30.0'	-27.9'	118.5°	30°01.2'	-28.8'	119.0°	29°31.9'	-29.7'	119.5°	29°02.2'	-30.6'	120.0°	28°32.0'	-31.5'	120.4°	28°01.4'	-32.4'	120.9°	27°30.4'	-33.2'	121.3°	16
17	30°02.1'	-28.4'	119.5°	29°32.4'	-29.3'	120.0°	29°02.2'	-30.2'	120.5°	28°31.5'	-31.1'	120.9°	28°00.5'	-31.9'	121.4°	27°29.0'	-32.8'	121.8°	26°57.2'	-33.6'	122.3°	17
18	29°33.8'	-28.8'	120.5°	29°03.1'	-29.7'	121.0°	28°32.0'	-30.6'	121.5°	28°00.5'	-31.5'	121.9°	27°28.6'	-32.3'	122.4°	26°56.3'	-33.1'	122.8°	26°23.6'	-33.9'	123.2°	18
19	29°04.9'	-29.3'	121.5°	28°33.4'	-30.2'	122.0°	28°01.4'	-31.0'	122.4°	27°29.0'	-31.9'	122.9°	26°56.3'	-32.7'	123.3°	26°23.1'	-33.5'	123.7°	25°49.6'	-34.3'	124.1°	19
20	28°35.7'	-29.7'	122.5°	28°03.2'	-30.6'	123.0°	27°30.4'	-31.4'	123.4°	26°57.2'	-32.2'	123.8°	26°23.6'	-33.0'	124.2°	25°49.6'	-33.8'	124.6°	25°15.4'	-34.6'	125.0°	20
21	28°06.0'	-30.1'	123.5°	27°32.7'	-31.0'	123.9°	26°59.0'	-31.8'	124.4°	26°24.9'	-32.6'	124.8°	25°50.5'	-33.4'	125.2°	25°15.8'	-34.2'	125.6°	24°40.8'	-34.9'	125.9°	21
22	27°35.8'	-30.5'	124.5°	27°01.7'	-31.4'	124.9°	26°27.2'	-32.2'	125.3°	25°52.3'	-33.0'	125.7°	25°17.1'	-33.7'	126.1°	24°41.6'	-34.5'	126.5°	24°05.8'	-35.2'	126.8°	22
23	27°05.3'	-30.9'	125.4°	26°30.3'	-31.7'	125.8°	25°55.0'	-32.5'	126.2°	25°19.4'	-33.3'	126.6°	24°43.4'	-34.1'	127.0°	24°07.1'	-34.8'	127.4°	23°30.6'	-35.5'	127.7°	23

52° 308° LHA

Latitude CONTRARY to DECLINATION

52° 308° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

51° 309° LHA

Latitude CONTRARY to Declination

51° 309° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	37°38.0'	-18.7'	101.1°	37°26.2'	-19.9'	101.8°	37°13.5'	-21.1'	102.6°	37°00.0'	-22.3'	103.3°	36°45.8'	-23.5'	104.0°	36°30.9'	-24.6'	104.8°	36°15.2'	-25.8'	105.5°	0
1	37°19.3'	-19.4'	102.3°	37°06.3'	-20.6'	103.0°	36°52.4'	-21.8'	103.8°	36°37.7'	-23.0'	104.5°	36°22.4'	-24.1'	105.2°	36°06.3'	-25.3'	105.9°	35°49.5'	-26.4'	106.6°	1
2	36°59.9'	-20.1'	103.5°	36°45.6'	-21.3'	104.2°	36°30.6'	-22.5'	104.9°	36°14.8'	-23.6'	105.6°	35°58.2'	-24.8'	106.3°	35°41.0'	-25.9'	107.0°	35°23.1'	-27.0'	107.7°	2
3	36°39.9'	-20.8'	104.6°	36°24.3'	-22.0'	105.4°	36°08.1'	-23.1'	106.1°	35°51.1'	-24.3'	106.8°	35°33.5'	-25.4'	107.5°	35°15.1'	-26.5'	108.1°	34°56.1'	-27.6'	108.8°	3
4	36°19.1'	-21.5'	105.8°	36°02.4'	-22.6'	106.5°	35°45.0'	-23.8'	107.2°	35°26.9'	-24.9'	107.9°	35°08.1'	-26.0'	108.6°	34°48.7'	-27.1'	109.2°	34°28.6'	-28.1'	109.9°	4
5	35°57.6'	-22.1'	107.0°	35°39.7'	-23.3'	107.7°	35°21.2'	-24.4'	108.3°	35°02.0'	-25.5'	109.0°	34°42.1'	-26.6'	109.7°	34°21.6'	-27.6'	110.3°	34°00.5'	-28.7'	110.9°	5
6	35°35.5'	-22.8'	108.1°	35°16.5'	-23.9'	108.8°	34°56.8'	-25.0'	109.5°	34°36.5'	-26.1'	110.1°	34°15.6'	-27.1'	110.7°	33°54.0'	-28.2'	111.4°	33°31.8'	-29.2'	112.0°	6
7	35°12.7'	-23.4'	109.2°	34°52.6'	-24.5'	109.9°	34°31.8'	-25.6'	110.6°	34°10.4'	-26.6'	111.2°	33°48.4'	-27.7'	111.8°	33°25.8'	-28.7'	112.4°	33°02.6'	-29.7'	113.0°	7
8	34°49.3'	-24.0'	110.4°	34°28.1'	-25.1'	111.0°	34°06.2'	-26.2'	111.7°	33°43.8'	-27.2'	112.3°	33°20.7'	-28.2'	112.9°	32°57.1'	-29.2'	113.5°	32°32.9'	-30.2'	114.1°	8
9	34°25.2'	-24.6'	111.5°	34°03.0'	-25.7'	112.1°	33°40.1'	-26.7'	112.7°	33°16.6'	-27.8'	113.3°	32°52.5'	-28.8'	113.9°	32°27.9'	-29.7'	114.5°	32°02.7'	-30.7'	115.1°	9
10	34°00.6'	-25.2'	112.6°	33°37.3'	-26.3'	113.2°	33°13.3'	-27.3'	113.8°	32°48.8'	-28.3'	114.4°	32°23.8'	-29.3'	115.0°	31°58.1'	-30.2'	115.6°	31°32.0'	-31.2'	116.1°	10
11	33°35.4'	-25.8'	113.7°	33°11.0'	-26.8'	114.3°	32°46.1'	-27.8'	114.9°	32°20.5'	-28.8'	115.5°	31°54.5'	-29.8'	116.0°	31°27.9'	-30.7'	116.6°	31°00.8'	-31.6'	117.1°	11
12	33°09.6'	-26.3'	114.8°	32°44.2'	-27.3'	115.4°	32°18.3'	-28.3'	115.9°	31°51.8'	-29.3'	116.5°	31°24.7'	-30.2'	117.0°	30°57.2'	-31.2'	117.6°	30°29.2'	-32.1'	118.1°	12
13	32°43.3'	-26.9'	115.8°	32°16.9'	-27.9'	116.4°	31°49.9'	-28.8'	117.0°	31°22.5'	-29.8'	117.5°	30°54.5'	-30.7'	118.0°	30°26.0'	-31.6'	118.6°	29°57.1'	-32.5'	119.1°	13
14	32°16.4'	-27.4'	116.9°	31°49.0'	-28.4'	117.5°	31°21.1'	-29.3'	118.0°	30°52.7'	-30.2'	118.5°	30°23.8'	-31.2'	119.0°	29°54.4'	-32.0'	119.6°	29°24.6'	-32.9'	120.0°	14
15	31°49.0'	-27.9'	117.9°	31°20.6'	-28.9'	118.5°	30°51.8'	-29.8'	119.0°	30°22.4'	-30.7'	119.5°	29°52.6'	-31.6'	120.0°	29°22.4'	-32.5'	120.5°	28°51.7'	-33.3'	121.0°	15
16	31°21.1'	-28.4'	119.0°	30°51.8'	-29.3'	119.5°	30°22.0'	-30.2'	120.0°	29°51.7'	-31.1'	120.5°	29°21.1'	-32.0'	121.0°	28°49.9'	-32.9'	121.5°	28°18.4'	-33.7'	122.0°	16
17	30°52.7'	-28.9'	120.0°	30°22.4'	-29.8'	120.5°	29°51.7'	-30.7'	121.0°	29°20.6'	-31.6'	121.5°	28°49.0'	-32.4'	122.0°	28°17.1'	-33.3'	122.4°	27°44.7'	-34.1'	122.9°	17
18	30°23.8'	-29.4'	121.0°	29°52.6'	-30.3'	121.5°	29°21.1'	-31.1'	122.0°	28°49.0'	-32.0'	122.5°	28°16.6'	-32.8'	122.9°	27°43.8'	-33.6'	123.4°	27°10.6'	-34.4'	123.8°	18
19	29°54.4'	-29.8'	122.0°	29°22.4'	-30.7'	122.5°	28°49.9'	-31.5'	123.0°	28°17.1'	-32.4'	123.4°	27°43.8'	-33.2'	123.9°	27°10.2'	-34.0'	124.3°	26°36.2'	-34.8'	124.7°	19
20	29°24.6'	-30.3'	123.0°	28°51.7'	-31.1'	123.5°	28°18.4'	-32.0'	124.0°	27°44.7'	-32.8'	124.4°	27°10.6'	-33.6'	124.8°	26°36.2'	-34.4'	125.2°	26°01.4'	-35.1'	125.6°	20
21	28°54.4'	-30.7'	124.0°	28°20.6'	-31.5'	124.5°	27°46.4'	-32.3'	124.9°	27°11.9'	-33.1'	125.3°	26°37.0'	-33.9'	125.8°	26°01.8'	-34.7'	126.2°	25°26.2'	-35.5'	126.5°	21

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

50° 310° LHA

Latitude CONTRARY to Declination

50° 310° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	38°35.1'	-18.9'	101.5°	38°22.8'	-20.2'	102.3°	38°09.7'	-21.4'	103.0°	37°55.8'	-22.6'	103.8°	37°41.1'	-23.8'	104.5°	37°25.7'	-24.9'	105.3°	37°09.5'	-26.1'	106.0°	0
1	38°16.2'	-19.7'	102.7°	38°02.7'	-20.9'	103.5°	37°48.3'	-22.1'	104.2°	37°33.2'	-23.3'	105.0°	37°17.4'	-24.4'	105.7°	37°00.8'	-25.6'	106.4°	36°43.4'	-26.7'	107.1°	1
2	37°56.5'	-20.4'	103.9°	37°41.8'	-21.6'	104.6°	37°26.2'	-22.8'	105.4°	37°09.9'	-23.9'	106.1°	36°52.9'	-25.1'	106.8°	36°35.2'	-26.2'	107.6°	36°16.7'	-27.3'	108.3°	2
3	37°36.1'	-21.1'	105.1°	37°20.2'	-22.3'	105.8°	37°03.4'	-23.5'	106.5°	36°46.0'	-24.6'	107.3°	36°27.8'	-25.7'	108.0°	36°09.0'	-26.8'	108.7°	35°49.4'	-27.9'	109.4°	3
4	37°15.0'	-21.8'	106.3°	36°57.9'	-23.0'	107.0°	36°40.0'	-24.1'	107.7°	36°21.4'	-25.2'	108.4°	36°02.1'	-26.3'	109.1°	35°42.2'	-27.4'	109.8°	35°21.5'	-28.5'	110.4°	4
5	36°53.2'	-22.5'	107.4°	36°34.9'	-23.6'	108.1°	36°15.9'	-24.8'	108.8°	35°56.2'	-25.9'	109.5°	35°35.8'	-26.9'	110.2°	35°14.7'	-28.0'	110.9°	34°53.0'	-29.1'	111.5°	5
6	36°30.7'	-23.2'	108.6°	36°11.3'	-24.3'	109.3°	35°51.1'	-25.4'	110.0°	35°30.3'	-26.5'	110.6°	35°08.8'	-27.5'	111.3°	34°46.7'	-28.6'	111.9°	34°24.0'	-29.6'	112.6°	6
7	36°07.6'	-24.8'	109.7°	35°47.0'	-24.9'	110.4°	35°25.7'	-26.0'	111.1°	35°03.8'	-27.1'	111.7°	34°41.3'	-28.1'	112.4°	34°18.1'	-29.1'	113.0°	33°54.4'	-30.1'	113.6°	7
8	35°43.8'	-24.4'	110.9°	35°22.1'	-25.5'	111.5°	34°59.7'	-26.6'	112.2°	34°36.8'	-27.6'	112.8°	34°13.2'	-28.7'	113.5°	33°49.0'	-29.7'	114.1°	33°24.3'	-30.6'	114.7°	8
9	35°19.3'	-25.1'	112.0°	34°56.5'	-26.1'	112.6°	34°33.1'	-27.2'	113.3°	34°09.1'	-28.2'	113.9°	33°44.5'	-29.2'	114.5°	33°19.4'	-30.2'	115.1°	32°53.6'	-31.1'	115.7°	9
10	34°54.3'	-25.7'	113.1°	34°30.4'	-26.7'	113.7°	34°06.0'	-27.7'	114.3°	33°41.0'	-28.7'	115.0°	33°15.4'	-29.7'	115.6°	32°49.2'	-30.7'	116.1°	32°22.5'	-31.6'	116.7°	10
11	34°28.6'	-26.2'	114.2°	34°03.7'	-27.3'	114.8°	33°38.3'	-28.3'	115.4°	33°12.2'	-29.3'	116.0°	32°45.6'	-30.2'	116.6°	32°18.5'	-31.2'	117.2°	31°50.9'	-32.1'	117.7°	11
12	34°02.4'	-26.8'	115.3°	33°36.5'	-27.8'	115.9°	33°10.0'	-28.8'	116.5°	32°43.0'	-29.8'	117.1°	32°15.4'	-30.7'	117.6°	31°47.4'	-31.6'	118.2°	31°18.8'	-32.5'	118.7°	12
13	33°35.6'	-27.4'	116.4°	33°08.7'	-28.3'	116.9°	32°41.2'	-29.3'	117.5°	32°13.2'	-30.3'	118.1°	31°44.7'	-31.2'	118.6°	31°15.7'	-32.1'	119.2°	30°46.2'	-33.0'	119.7°	13
14	33°08.2'	-27.9'	117.4°	32°40.3'	-28.9'	118.0°	32°11.9'	-29.8'	118.6°	31°43.0'	-30.7'	119.1°	31°13.5'	-31.6'	119.6°	30°43.6'	-32.5'	120.2°	30°13.3'	-33.4'	120.7°	14
15	32°40.3'	-28.4'	118.5°	32°11.5'	-29.4'	119.0°	31°42.1'	-30.3'	119.6°	31°12.2'	-31.2'	120.1°	30°41.9'	-32.1'	120.6°	30°11.1'	-33.0'	121.1°	29°39.9'	-33.8'	121.6°	15
16	32°11.9'	-28.9'	119.5°	31°42.1'	-29.9'	120.1°	31°11.8'	-30.8'	120.6°	30°41.0'	-31.7'	121.1°	30°09.8'	-32.5'	121.6°	29°38.1'	-33.4'	122.1°	29°06.1'	-34.2'	122.6°	16
17	31°43.0'	-29.4'	120.6°	31°12.2'	-30.3'	121.1°	30°41.0'	-31.2'	121.6°	30°09.4'	-32.1'	122.1°	29°37.3'	-32.9'	122.6°	29°04.8'	-33.8'	123.0°	28°31.9'	-34.6'	123.5°	17
18	31°13.5'	-29.9'	121.6°	30°41.9'	-30.8'	122.1°	30°09.8'	-31.7'	122.6°	29°37.3'	-32.5'	123.1°	29°04.3'	-33.3'	123.5°	28°31.0'	-34.2'	124.0°	27°57.3'	-35.0'	124.4°	18
19	30°43.6'	-30.4'	122.6°	30°11.1'	-31.2'	123.1°	29°38.1'	-32.1'	123.6°	29°04.8'	-32.9'	124.0°	28°31.0'	-33.7'	124.5°	27°56.8'	-34.5'	124.9°	27°22.3'	-35.3'	125.4°	19
20	30°13.3'	-30.8'	123.6°	29°39.9'	-31.7'	124.1°	29°06.1'	-32.5'	124.5°	28°31.9'	-33.3'	125.0°	27°57.3'	-34.1'	125.4°	27°22.3'	-34.9'	125.8°	26°47.0'	-35.7'	126.3°	20
21	29°42.4'	-31.3'	124.6°	29°08.2'	-32.1'	125.0°	28°33.6'	-32.9'	125.5°	27°58.5'	-33.7'	125.9°	27°23.2'	-34.5'	126.3°	26°47.4'	-35.2'	126.8°	26°11.3'	-36.0'	127.2°	21
22	29°11.2'	-31.7'	125.6°	28°36.1'	-32.5'	126.0°	28°00.7'	-33.3'	126.4°	27°24.8'	-34.1'	126.9°	26°48.7'	-34.8'	127.3°	26°12.2'	-35.6'	127.7°	25°35.4'	-36.3'	128.0°	22
23	28°39.5'	-32.1'	126.5°	28°03.6'	-32.9'	127.0°	27°27.4'	-33.7'	127.4°	26°50.8'	-34.4'	127.8°	26°13.8'	-35.2'	128.2°	25°36.6'	-35.9'	128.6°	24°59.1'	-36.6'	128.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

50° 310° LHA

Latitude CONTRARY to DECLINATION

50° 310° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

49° 311° LHA

Latitude CONTRARY to Declination

49° 311° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	39°32.1'	-19.2'	101.9°	39°19.4'	-20.5'	102.7°	39°05.9'	-21.7'	103.5°	38°51.5'	-22.9'	104.3°	38°36.3'	-24.1'	105.0°	38°20.4'	-25.2'	105.8°	38°03.6'	-26.4'	106.6°	0
1	39°12.9'	-20.0'	103.1°	38°59.0'	-21.2'	103.9°	38°44.2'	-22.4'	104.7°	38°28.6'	-23.6'	105.4°	38°12.2'	-24.8'	106.2°	37°55.1'	-25.9'	107.0°	37°37.2'	-27.0'	107.7°	1
2	38°53.0'	-20.7'	104.3°	38°37.8'	-21.9'	105.1°	38°21.8'	-23.1'	105.9°	38°05.0'	-24.3'	106.6°	37°47.5'	-25.4'	107.4°	37°29.2'	-26.6'	108.1°	37°10.2'	-27.7'	108.8°	2
3	38°32.3'	-21.5'	105.5°	38°15.9'	-22.6'	106.3°	37°58.7'	-23.8'	107.0°	37°40.7'	-25.0'	107.8°	37°22.0'	-26.1'	108.5°	37°02.6'	-27.2'	109.2°	36°42.5'	-28.3'	109.9°	3
4	38°10.8'	-22.2'	106.7°	37°53.2'	-23.3'	107.5°	37°34.9'	-24.5'	108.2°	37°15.8'	-25.6'	108.9°	36°55.9'	-26.7'	109.6°	36°35.4'	-27.8'	110.3°	36°14.3'	-28.9'	111.0°	4
5	37°48.7'	-22.9'	107.9°	37°29.9'	-24.0'	108.6°	37°10.4'	-25.1'	109.3°	36°50.1'	-26.2'	110.1°	36°29.2'	-27.3'	110.8°	36°07.6'	-28.4'	111.4°	35°45.4'	-29.4'	112.1°	5
6	37°25.8'	-23.5'	109.1°	37°05.9'	-24.7'	109.8°	36°45.2'	-25.8'	110.5°	36°23.9'	-26.9'	111.2°	36°01.9'	-27.9'	111.9°	35°39.2'	-29.0'	112.5°	35°15.9'	-30.0'	113.2°	6
7	37°02.3'	-24.2'	110.2°	36°41.2'	-25.3'	110.9°	36°19.4'	-26.4'	111.6°	35°57.0'	-27.5'	112.3°	35°34.0'	-28.5'	112.9°	35°10.2'	-29.5'	113.6°	34°45.9'	-30.5'	114.2°	7
8	36°38.1'	-24.9'	111.4°	36°15.9'	-25.9'	112.0°	35°53.0'	-27.0'	112.7°	35°29.5'	-28.1'	113.4°	35°05.4'	-29.1'	114.0°	34°40.7'	-30.1'	114.7°	34°15.4'	-31.1'	115.3°	8
9	36°13.2'	-25.5'	112.5°	35°49.9'	-26.6'	113.2°	35°26.0'	-27.6'	113.8°	35°01.5'	-28.6'	114.5°	34°36.3'	-29.6'	115.1°	34°10.6'	-30.6'	115.7°	33°44.3'	-31.6'	116.3°	9
10	35°47.7'	-26.1'	113.6°	35°23.4'	-27.2'	114.3°	34°58.4'	-28.2'	114.9°	34°32.9'	-29.2'	115.5°	34°06.7'	-30.2'	116.1°	33°40.0'	-31.1'	116.7°	33°12.7'	-32.1'	117.3°	10
11	35°21.6'	-26.7'	114.7°	34°56.2'	-27.7'	115.4°	34°30.2'	-28.7'	116.0°	34°03.7'	-29.7'	116.6°	33°36.5'	-30.7'	117.2°	33°08.9'	-31.6'	117.8°	32°40.6'	-32.6'	118.3°	11
12	34°54.9'	-27.3'	115.8°	34°28.5'	-28.3'	116.4°	34°01.5'	-29.3'	117.0°	33°34.0'	-30.2'	117.6°	33°05.9'	-31.2'	118.2°	32°37.2'	-32.1'	118.8°	32°08.1'	-33.0'	119.3°	12
13	34°27.6'	-27.9'	116.9°	34°00.2'	-28.8'	117.5°	33°32.2'	-29.8'	118.1°	33°03.7'	-30.7'	118.7°	32°34.7'	-31.7'	119.2°	32°05.1'	-32.6'	119.8°	31°35.1'	-33.5'	120.3°	13
14	33°59.8'	-28.4'	118.0°	33°31.4'	-29.4'	118.6°	33°02.4'	-30.3'	119.1°	32°33.0'	-31.2'	119.7°	32°03.0'	-32.1'	120.2°	31°32.5'	-33.0'	120.8°	31°01.6'	-33.9'	121.3°	14
15	33°31.4'	-28.9'	119.0°	33°02.0'	-29.9'	119.6°	32°32.1'	-30.8'	120.2°	32°01.7'	-31.7'	120.7°	31°30.8'	-32.6'	121.2°	30°59.5'	-33.5'	121.7°	30°27.7'	-34.3'	122.2°	15
16	33°02.4'	-29.5'	120.1°	32°32.1'	-30.4'	120.6°	32°01.3'	-31.3'	121.2°	31°30.0'	-32.2'	121.7°	30°58.3'	-33.0'	122.2°	30°26.0'	-33.9'	122.7°	29°53.4'	-34.7'	123.2°	16
17	32°33.0'	-30.0'	121.1°	32°01.7'	-30.9'	121.6°	31°30.0'	-31.8'	122.2°	30°57.8'	-32.6'	122.7°	30°25.2'	-33.5'	123.2°	29°52.2'	-34.3'	123.7°	29°18.7'	-35.1'	124.1°	17
18	32°03.0'	-30.5'	122.1°	31°30.8'	-31.3'	122.7°	30°58.3'	-32.2'	123.2°	30°25.2'	-33.0'	123.7°	29°51.7'	-33.9'	124.1°	29°17.9'	-34.7'	124.6°	28°43.6'	-35.5'	125.1°	18
19	31°32.5'	-30.9'	123.1°	30°59.5'	-31.8'	123.7°	30°26.0'	-32.6'	124.2°	29°52.2'	-33.5'	124.6°	29°17.9'	-34.3'	125.1°	28°43.2'	-35.1'	125.5°	27°32.3'	-36.2'	126.0°	19
20	31°01.6'	-31.4'	124.1°	30°27.7'	-32.2'	124.6°	29°53.4'	-33.1'	125.1°	29°18.7'	-33.9'	125.6°	28°43.6'	-34.7'	126.0°							

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

48° 312° LHA

Latitude CONTRARY to Declination

48° 312° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	40°29.1'	-19.5'	102.3°	40°15.9'	-20.7'	103.1°	40°01.9'	-22.0'	103.9°	39°47.0'	-23.2'	104.7°	39°31.3'	-24.4'	105.5°	39°14.9'	-25.6'	106.3°	38°57.6'	-26.7'	107.1°	0
1	40°09.6'	-20.3'	103.5°	39°55.2'	-21.5'	104.3°	39°39.9'	-22.7'	105.2°	39°23.8'	-23.9'	105.9°	39°07.0'	-25.1'	106.7°	38°49.3'	-26.3'	107.5°	38°30.9'	-27.4'	108.3°	1
2	39°49.3'	-21.0'	104.8°	39°33.7'	-22.3'	105.6°	39°17.2'	-23.5'	106.3°	38°59.9'	-24.6'	107.1°	38°41.9'	-25.8'	107.9°	38°23.0'	-26.9'	108.7°	38°03.5'	-28.0'	109.4°	2
3	39°28.3'	-21.8'	106.0°	39°11.4'	-23.0'	106.8°	38°53.7'	-24.2'	107.5°	38°35.3'	-25.3'	108.3°	38°16.1'	-26.5'	109.1°	37°56.1'	-27.6'	109.8°	37°35.4'	-28.7'	110.5°	3
4	39°06.5'	-22.5'	107.2°	38°48.4'	-23.7'	107.9°	38°29.6'	-24.9'	108.7°	38°09.9'	-26.0'	109.5°	37°49.6'	-27.1'	110.2°	37°28.5'	-28.2'	110.9°	37°06.8'	-29.3'	111.6°	4
5	38°44.0'	-23.2'	108.4°	38°24.7'	-24.4'	109.1°	38°04.7'	-25.5'	109.9°	37°44.0'	-26.7'	110.6°	37°22.5'	-27.7'	111.3°	37°00.3'	-28.8'	112.0°	36°37.5'	-29.9'	112.7°	5
6	38°20.8'	-23.9'	109.5°	38°00.3'	-25.1'	110.3°	37°39.2'	-26.2'	111.0°	37°17.3'	-27.3'	111.7°	36°54.7'	-28.4'	112.4°	36°31.5'	-29.4'	113.1°	36°07.6'	-30.4'	113.8°	6
7	37°56.8'	-24.6'	110.7°	37°35.2'	-25.7'	111.4°	37°13.0'	-26.8'	112.1°	36°50.0'	-27.9'	112.8°	36°26.4'	-29.0'	113.5°	36°02.1'	-30.0'	114.2°	35°37.2'	-31.0'	114.9°	7
8	37°32.2'	-25.3'	111.9°	37°09.5'	-26.4'	112.6°	36°46.1'	-27.5'	113.3°	36°22.1'	-28.5'	113.9°	35°57.4'	-29.5'	114.6°	35°32.1'	-30.5'	115.3°	35°06.2'	-31.5'	115.9°	8
9	37°06.9'	-25.9'	113.0°	36°43.1'	-27.0'	113.7°	36°18.7'	-28.1'	114.4°	35°53.6'	-29.1'	115.0°	35°27.9'	-30.1'	115.7°	35°01.6'	-31.1'	116.3°	34°34.7'	-32.0'	116.9°	9
10	36°41.0'	-26.6'	114.1°	36°16.1'	-27.6'	114.8°	35°50.6'	-28.7'	115.5°	35°24.5'	-29.7'	116.1°	34°57.8'	-30.6'	116.7°	34°30.5'	-31.6'	117.4°	34°02.7'	-32.5'	118.0°	10
11	36°14.4'	-27.2'	115.2°	35°48.5'	-28.2'	115.9°	35°22.0'	-29.2'	116.5°	34°54.9'	-30.2'	117.2°	34°27.2'	-31.2'	117.8°	33°58.9'	-32.1'	118.4°	33°30.1'	-33.0'	119.0°	11
12	35°47.2'	-27.8'	116.4°	35°20.3'	-28.8'	117.0°	34°52.7'	-29.8'	117.6°	34°24.6'	-30.7'	118.2°	33°56.0'	-31.7'	118.8°	33°26.8'	-32.6'	119.4°	32°57.1'	-33.5'	120.0°	12
13	35°19.4'	-28.4'	117.4°	34°51.5'	-29.3'	118.1°	34°23.0'	-30.3'	118.7°	33°53.9'	-31.3'	119.3°	33°24.3'	-32.2'	119.8°	32°54.2'	-33.1'	120.4°	32°23.6'	-34.0'	121.0°	13
14	34°51.1'	-28.9'	118.5°	34°22.1'	-29.9'	119.1°	33°52.7'	-30.8'	119.7°	33°22.7'	-31.8'	120.3°	32°52.1'	-32.7'	120.9°	32°21.1'	-33.5'	121.4°	31°49.6'	-34.4'	121.9°	14
15	34°22.1'	-29.5'	119.6°	33°52.2'	-30.4'	120.2°	33°21.8'	-31.3'	120.7°	32°50.9'	-32.2'	121.3°	32°19.5'	-33.1'	121.8°	31°47.6'	-34.0'	122.4°	31°15.2'	-34.8'	122.9°	15
16	33°52.7'	-30.0'	120.6°	33°21.8'	-30.9'	121.2°	32°50.5'	-31.8'	121.8°	32°18.7'	-32.7'	122.3°	31°46.4'	-33.6'	122.8°	31°13.6'	-34.4'	123.3°	30°40.4'	-35.2'	123.8°	16
17	33°22.7'	-30.5'	121.7°	32°50.9'	-31.4'	122.2°	32°18.7'	-32.3'	122.8°	31°46.0'	-33.2'	123.3°	31°12.8'	-34.0'	123.8°	30°39.2'	-34.8'	124.3°	30°05.2'	-35.6'	124.8°	17
18	32°52.1'	-31.0'	122.7°	32°19.5'	-31.9'	123.2°	31°46.4'	-32.8'	123.8°	31°12.8'	-33.6'	124.3°	30°38.8'	-34.4'	124.8°	30°04.4'	-35.2'	125.2°	29°29.6'	-36.0'	125.7°	18
19	32°21.1'	-31.5'	123.7°	31°47.6'	-32.4'	124.2°	31°13.6'	-33.2'	124.7°	30°39.2'	-34.0'	125.2°	30°04.4'	-34.8'	125.7°	29°29.2'	-35.6'	126.2°	28°53.6'	-36.4'	126.6°	19
20	31°49.6'	-32.0'	124.7°	31°15.2'	-32.8'	125.2°	30°40.4'	-33.6'	125.7°	30°05.2'	-34.4'	126.2°	29°29.6'	-35.2'	126.7°	28°53.6'	-36.0'	127.1°	28°17.2'	-36.7'	127.5°	20
21	31°17.7'	-32.4'	125.7°	30°42.4'	-33.2'	126.2°	30°06.8'	-34.0'	126.7°	29°30.8'	-34.8'	127.1°	28°54.3'	-35.6'	127.6°	28°17.6'	-36.3'	128.0°	27°40.5'	-37.1'	128.4°	21
22	30°45.2'	-32.9'	126.7°	30°09.2'	-33.7'	127.2°	29°32.7'	-34.4'	127.6°	28°55.9'	-35.2'	128.1°	28°18.8'	-36.0'	128.5°	27°41.2'	-36.7'	128.9°	27°03.4'	-37.4'	129.3°	22
23	30°12.4'	-33.3'	127.7°	29°35.5'	-34.1'	128.1°	28°58.3'	-34.8'	128.6°	28°20.7'	-35.6'	129.0°	27°42.8'	-36.3'	129.4°	27°04.6'	-37.0'	129.8°	26°26.0'	-37.7'	130.2°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

48° 312° LHA

Latitude CONTRARY to DECLINATION

48° 312° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

47° 313° LHA

Latitude CONTRARY to Declination

47° 313° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	41°25.9'	-19.8'	102.7°	41°12.3'	-21.0'	103.6°	40°57.8'	-22.3'	104.4°	40°42.5'	-23.5'	105.3°	40°26.3'	-24.7'	106.1°	40°09.2'	-25.9'	106.9°	39°51.4'	-27.1'	107.7°	0
1	41°06.1'	-20.6'	104.0°	40°51.3'	-21.8'	104.8°	40°35.5'	-23.1'	105.6°	40°18.9'	-24.3'	106.5°	40°01.5'	-25.5'	107.3°	39°43.3'	-26.6'	108.1°	39°24.3'	-27.8'	108.8°	1
2	40°45.6'	-21.4'	105.2°	40°29.4'	-22.6'	106.0°	40°12.5'	-23.8'	106.9°	39°54.7'	-25.0'	107.7°	39°36.1'	-26.2'	108.4°	39°16.7'	-27.3'	109.2°	38°56.6'	-28.4'	110.0°	2
3	40°24.2'	-22.1'	106.4°	40°06.8'	-23.4'	107.3°	39°48.6'	-24.5'	108.1°	39°29.7'	-25.7'	108.8°	39°09.9'	-26.8'	109.6°	38°49.4'	-28.0'	110.4°	38°28.1'	-29.1'	111.1°	3
4	40°02.1'	-22.9'	107.7°	39°43.5'	-24.1'	108.5°	39°24.1'	-25.3'	109.2°	39°04.0'	-26.4'	110.0°	38°43.1'	-27.5'	110.8°	38°21.4'	-28.6'	111.5°	37°59.1'	-29.7'	112.2°	4
5	39°39.2'	-23.6'	108.9°	39°19.4'	-24.8'	109.6°	38°58.9'	-25.9'	110.4°	38°37.6'	-27.1'	111.2°	38°15.5'	-28.2'	111.9°	37°52.8'	-29.2'	112.6°	37°29.4'	-30.3'	113.3°	5
6	39°15.5'	-24.4'	110.1°	38°54.6'	-25.5'	110.8°	38°32.9'	-26.6'	111.6°	38°10.5'	-27.7'	112.3°	37°47.4'	-28.8'	113.0°	37°23.6'	-29.8'	113.7°	36°59.1'	-30.9'	114.4°	6
7	38°51.2'	-25.1'	111.2°	38°29.1'	-26.2'	112.0°	38°06.3'	-27.3'	112.7°	37°42.8'	-28.4'	113.4°	37°18.6'	-29.4'	114.1°	36°53.7'	-30.4'	114.8°	36°28.2'	-31.4'	115.5°	7
8	38°26.1'	-25.7'	112.4°	38°02.9'	-26.8'	113.1°	37°39.0'	-27.9'	113.8°	37°14.4'	-29.0'	114.5°	36°49.2'	-30.0'	115.2°	36°23.3'	-31.0'	115.9°	35°56.8'	-32.0'	116.5°	8
9	38°00.4'	-26.4'	113.5°	37°36.1'	-27.5'	114.3°	37°11.1'	-28.5'	114.9°	36°45.5'	-29.6'	115.6°	36°19.2'	-30.6'	116.3°	35°52.3'	-31.6'	116.9°	35°24.8'	-32.5'	117.6°	9
10	37°34.0'	-27.1'	114.7°	37°08.6'	-28.1'	115.4°	36°42.6'	-29.1'	116.0°	36°15.9'	-30.1'	116.7°	35°48.6'	-31.1'	117.4°	35°20.8'	-32.1'	118.0°	34°52.3'	-33.0'	118.6°	10
11	37°06.9'	-27.7'	115.8°	36°40.5'	-28.7'	116.5°	36°13.4'	-29.7'	117.1°	35°45.8'	-30.7'	117.8°	35°17.5'	-31.7'	118.4°	34°48.7'	-32.6'	119.0°	34°19.3'	-33.5'	119.6°	11
12	36°39.2'	-28.3'	116.9°	36°11.8'	-29.3'	117.6°	35°43.7'	-30.3'	118.2°	35°15.1'	-31.2'	118.8°	34°45.8'	-32.2'	119.4°	34°16.1'	-33.1'	120.0°	33°45.8'	-34.0'	120.6°	12
13	36°10.9'	-28.9'	118.0°	35°42.5'	-29.9'	118.6°	35°13.4'	-30.8'	119.3°	34°43.8'	-31.8'	119.9°	34°13.7'	-32.7'	120.5°	33°43.0'	-33.6'	121.1°	33°11.8'	-34.5'	121.6°	13
14	35°42.1'	-29.5'	119.1°	35°12.6'	-30.4'	119.7°	34°42.6'	-31.4'	120.3°	34°12.0'	-32.3'	120.9°	33°41.0'	-33.2'	121.5°	33°09.4'	-34.1'	122.0°	32°37.3'	-34.9'	122.6°	14
15	35°12.6'	-30.0'	120.2°	34°42.2'	-31.0'	120.8°	34°11.2'	-31.9'	121.4°	33°39.8'	-32.8'	121.9°	33°07.8'	-33.6'	122.5°	32°35.3'	-34.5'	123.0°	32°02.4'	-35.3'	123.6°	15
16	34°42.6'	-30.6'	121.2°	34°11.2'	-31.5'	121.8°	33°39.4'	-32.4'	122.4°	33°07.0'	-33.2'	122.9°	32°34.1'	-34.1'	123.5°	32°00.8'	-34.9'	124.0°	31°27.1'	-35.8'	124.5°	16
17	34°12.0'	-31.1'	122.3°	33°39.8'	-32.0'	122.8°	33°07.0'	-32.9'	123.4°	32°33.7'	-33.7'	123.9°	32°00.0'	-34.5'	124.4°	31°25.9'	-35.4'	124.9°	30°51.3'	-36.2'	125.4°	17
18	33°41.0'	-31.6'	123.3°	33°07.8'	-32.5'	123.8°	32°34.1'	-33.3'	124.4°	32°00.0'	-34.2'	124.9°	31°25.5'	-35.0'	125.4°	30°50.5'	-35.8'	125.9°	30°15.2'	-36.5'	126.4°	18
19	33°09.4'	-32.1'	124.3°	32°35.3'	-32.9'	124.8°	32°00.8'	-33.8'	125.4°	31°25.9'	-35.6'	125.9°	30°50.5'	-35.4'	126.4°	30°14.8'	-36.2'	126.8°	29°38.6'	-36.9'	127.3°	19
20	32°37.3'	-32.6'	125.3°	32°02.4'	-33.4'	125.8°	31°27.1'	-34.2'	126.3°	30°51.3'	-35.0'	126.8°	30°15.2'	-35.8'								

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

46° 314° LHA

Latitude CONTRARY to Declination

46° 314° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	42°22.7'	-20.1'	103.1°	42°08.6'	-21.4'	104.0°	41°53.6'	-22.6'	104.9°	41°37.7'	-23.9'	105.8°	41°21.0'	-25.1'	106.6°	41°03.4'	-26.3'	107.5°	40°45.0'	-27.4'	108.3°	0
1	42°02.6'	-20.9'	104.4°	41°47.2'	-22.2'	105.3°	41°31.0'	-23.4'	106.1°	41°13.9'	-24.6'	107.0°	40°55.9'	-25.8'	107.8°	40°37.2'	-27.0'	108.6°	40°17.6'	-28.1'	109.4°	1
2	41°41.7'	-21.7'	105.7°	41°25.1'	-23.0'	106.5°	41°07.6'	-24.2'	107.4°	40°49.3'	-25.4'	108.2°	40°30.1'	-26.5'	109.0°	40°10.2'	-27.7'	109.8°	39°49.4'	-28.8'	110.6°	2
3	41°20.0'	-22.5'	106.9°	41°02.1'	-23.7'	107.8°	40°43.4'	-24.9'	108.6°	40°23.9'	-26.1'	109.4°	40°03.6'	-27.3'	110.2°	39°42.5'	-28.4'	111.0°	39°20.6'	-29.5'	111.7°	3
4	40°57.5'	-23.3'	108.2°	40°38.4'	-24.5'	109.0°	40°18.5'	-25.7'	109.8°	39°57.8'	-26.8'	110.6°	39°36.3'	-27.9'	111.3°	39°14.1'	-29.0'	112.1°	38°51.1'	-30.1'	112.9°	4
5	40°34.2'	-24.1'	109.4°	40°13.9'	-25.2'	110.2°	39°52.8'	-26.4'	111.0°	39°31.0'	-27.5'	111.7°	39°08.4'	-28.6'	112.5°	38°45.1'	-29.7'	113.2°	38°21.0'	-30.7'	114.0°	5
6	40°10.1'	-24.8'	110.6°	39°48.7'	-25.9'	111.4°	39°26.4'	-27.1'	112.1°	39°03.5'	-28.2'	112.9°	38°39.8'	-29.2'	113.6°	38°15.4'	-30.3'	114.3°	37°50.3'	-31.3'	115.1°	6
7	39°45.3'	-25.5'	111.8°	39°22.7'	-26.6'	112.5°	38°59.4'	-27.7'	113.3°	38°35.3'	-28.8'	114.0°	38°10.5'	-29.9'	114.7°	37°45.1'	-30.9'	115.4°	37°19.0'	-31.9'	116.1°	7
8	39°19.8'	-26.2'	112.9°	38°56.1'	-27.3'	113.7°	38°31.6'	-28.4'	114.4°	38°06.5'	-29.4'	115.1°	37°40.7'	-30.5'	115.8°	37°14.2'	-31.5'	116.5°	36°47.1'	-32.5'	117.2°	8
9	38°53.6'	-26.9'	114.1°	38°28.8'	-28.0'	114.8°	38°03.3'	-29.0'	115.5°	37°37.1'	-30.0'	116.2°	37°10.2'	-31.1'	116.9°	36°42.7'	-32.0'	117.6°	36°14.6'	-33.0'	118.2°	9
10	38°26.8'	-27.5'	115.2°	38°00.8'	-28.6'	116.0°	37°34.2'	-29.6'	116.6°	37°07.0'	-30.6'	117.3°	36°39.2'	-31.6'	118.0°	36°10.7'	-32.6'	118.6°	35°41.6'	-33.5'	119.3°	10
11	37°59.2'	-28.2'	116.4°	37°32.2'	-29.2'	117.1°	37°04.6'	-30.2'	117.7°	36°36.4'	-31.2'	118.4°	36°07.5'	-32.2'	119.0°	35°38.1'	-33.1'	119.7°	35°08.1'	-34.0'	120.3°	11
12	37°31.0'	-28.8'	117.5°	37°03.0'	-29.8'	118.2°	36°34.4'	-30.8'	118.8°	36°05.2'	-31.8'	119.5°	35°35.4'	-32.7'	120.1°	35°05.0'	-33.6'	120.7°	34°34.1'	-34.5'	121.3°	12
13	37°02.2'	-29.4'	118.6°	36°33.2'	-30.4'	119.2°	36°03.6'	-31.4'	119.9°	35°33.4'	-32.3'	120.5°	35°02.7'	-33.2'	121.1°	34°31.4'	-34.1'	121.7°	33°59.6'	-35.0'	122.3°	13
14	36°32.8'	-30.0'	119.7°	36°02.8'	-31.0'	120.3°	35°32.2'	-31.9'	120.9°	35°01.1'	-32.8'	121.5°	34°29.5'	-33.7'	122.1°	33°57.3'	-34.6'	122.7°	33°24.6'	-35.4'	123.3°	14
15	36°02.8'	-30.6'	120.8°	35°31.8'	-31.5'	121.4°	35°00.3'	-32.4'	122.0°	34°28.3'	-33.3'	122.6°	33°55.8'	-34.2'	123.1°	33°22.7'	-35.0'	123.7°	32°49.2'	-35.9'	124.2°	15
16	35°32.2'	-31.1'	121.8°	35°00.3'	-32.0'	122.4°	34°27.9'	-32.9'	123.0°	33°55.0'	-33.8'	123.6°	33°21.6'	-34.6'	124.1°	32°47.7'	-35.5'	124.7°	32°13.3'	-36.3'	125.2°	16
17	35°01.1'	-31.7'	122.9°	34°28.3'	-32.5'	123.4°	33°55.0'	-33.4'	124.0°	33°21.2'	-34.3'	124.6°	32°46.9'	-35.1'	125.1°	32°12.2'	-35.9'	125.6°	31°37.0'	-36.7'	126.1°	17
18	34°29.5'	-32.2'	123.9°	33°55.8'	-33.0'	124.5°	33°21.6'	-33.9'	125.0°	32°46.9'	-34.7'	125.5°	32°11.8'	-35.5'	126.1°	31°36.3'	-36.3'	126.6°	31°00.4'	-37.1'	127.0°	18
19	33°57.3'	-32.7'	124.9°	33°22.7'	-33.5'	125.5°	32°47.7'	-34.3'	126.0°	32°12.2'	-35.2'	126.5°	31°36.3'	-35.9'	127.0°	30°60.0'	-36.7'	127.5°	30°23.3'	-37.5'	128.0°	19
20	33°24.6'	-33.1'	125.9°	32°49.2'	-34.0'	126.5°	32°13.3'	-34.8'	127.0°	31°37.0'	-35.6'	127.5°	31°00.4'	-36.3'	127.9°	30°23.3'	-37.1'	128.4°	29°45.8'	-37.8'	128.9°	20
21	32°51.5'	-33.6'	126.9°	32°15.2'	-34.4'	127.4°	31°38.5'	-35.2'	127.9°	31°01.5'	-36.0'	128.4°	30°24.0'	-36.7'	128.9°	29°46.2'	-37.5'	129.3°	29°08.0'	-38.2'	129.8°	21
22	32°17.9'	-1582.3'	127.9°	31°40.8'	-1572.1'	128.4°	31°03.3'	-1561.6'	128.9°	30°25.5'	-1550.8'	129.3°	29°47.3'	-1539.7'	129.8°	29°08.7'	-1528.3'	130.2°	28°29.8'	-1516.6'	130.6°	22
23	31°43.8'	+695.5'	128.9°	31°05.9'	+718.8'	129.3°	30°27.7'	+741.6'	129.8°	29°49.1'	+763.8'	130.3°	29°10.2'	+785.4'	130.7°	28°30.9'	+806.6'	131.1°	27°51.3'	+827.2'	131.5°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			Dec°

134° 226° LHA

Latitude SAME as DECLINATION

134° 226° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

45° 315° LHA

Latitude CONTRARY to Declination

45° 315° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	43°19.3'	-20.4'	103.6°	43°04.8'	-21.7'	104.5°	42°49.3'	-23.0'	105.4°	42°32.9'	-24.2'	106.3°	42°15.6'	-25.4'	107.2°	41°57.5'	-26.6'	108.0°	41°38.5'	-27.8'	108.9°	0
1	42°58.9'	-21.2'	104.9°	42°43.1'	-22.5'	105.8°	42°26.3'	-23.8'	106.7°	42°08.7'	-25.0'	107.5°	41°50.2'	-26.2'	108.4°	41°30.8'	-27.4'	109.2°	41°10.6'	-28.5'	110.1°	1
2	42°37.7'	-22.1'	106.2°	42°20.6'	-23.3'	107.0°	42°02.5'	-24.6'	107.9°	41°43.7'	-25.8'	108.8°	41°24.0'	-26.9'	109.6°	41°03.4'	-28.1'	110.4°	40°42.1'	-29.2'	111.2°	2
3	42°15.6'	-22.9'	107.4°	41°57.2'	-24.1'	108.3°	41°38.0'	-25.3'	109.1°	41°17.9'	-26.5'	110.0°	40°57.0'	-27.7'	110.8°	40°35.3'	-28.8'	111.6°	40°12.9'	-29.9'	112.4°	3
4	41°52.7'	-23.7'	108.7°	41°33.1'	-24.9'	109.5°	41°12.6'	-26.1'	110.3°	40°51.4'	-27.2'	111.2°	40°29.4'	-28.4'	112.0°	40°06.5'	-29.5'	112.7°	39°43.0'	-30.5'	113.5°	4
5	41°29.0'	-24.5'	109.9°	41°08.2'	-25.7'	110.7°	40°46.6'	-26.8'	111.5°	40°24.2'	-27.9'	112.3°	40°01.0'	-29.0'	113.1°	39°37.1'	-30.1'	113.9°	39°12.4'	-31.2'	114.6°	5
6	41°04.5'	-25.2'	111.1°	40°42.5'	-26.4'	111.9°	40°19.8'	-27.5'	112.7°	39°56.2'	-28.6'	113.5°	39°31.9'	-29.7'	114.2°	39°06.9'	-30.8'	115.0°	38°41.2'	-31.8'	115.7°	6
7	40°39.3'	-26.0'	112.3°	40°16.2'	-27.1'	113.1°	39°52.2'	-28.2'	113.9°	39°27.6'	-29.3'	114.6°	39°02.2'	-30.3'	115.4°	38°36.2'	-31.4'	116.1°	38°09.5'	-32.4'	116.8°	7
8	40°13.3'	-26.7'	113.5°	39°49.1'	-27.8'	114.3°	39°24.0'	-28.9'	115.0°	38°58.3'	-29.9'	115.8°	38°31.9'	-31.0'	116.5°	38°04.8'	-32.0'	117.2°	37°37.1'	-32.9'	117.9°	8
9	39°46.7'	-27.4'	114.7°	39°21.3'	-28.5'	115.4°	38°55.2'	-29.5'	116.1°	38°28.4'	-30.5'	116.9°	38°00.9'	-31.6'	117.6°	37°32.9'	-32.5'	118.3°	37°04.1'	-33.5'	118.9°	9
10	39°19.3'	-28.1'	115.8°	38°52.8'	-29.1'	116.6°	38°25.7'	-30.1'	117.3°	37°57.8'	-31.1'	118.0°	37°29.4'	-32.1'	118.6°	37°00.3'	-33.1'	119.3°	36°30.7'	-34.0'	120.0°	10
11	38°51.2'	-28.7'	117.0°	38°23.7'	-29.7'	117.7°	37°55.5'	-30.7'	118.4°	37°26.7'	-31.7'	119.0°	36°57.3'	-32.7'	119.7°	36°27.2'	-33.6'	120.3°	35°56.6'	-34.5'	121.0°	11
12	38°22.5'	-29.3'	118.1°	37°54.0'	-30.3'	118.8°	37°24.8'	-31.3'	119.4°	36°55.0'	-32.3'	120.1°	36°24.6'	-33.2'	120.7°	35°53.6'	-34.1'	121.4°	35°22.1'	-35.0'	122.0°	12
13	37°53.2'	-30.0'	119.2°	37°23.6'	-30.9'	119.9°	36°53.4'	-31.9'	120.5°	36°22.7'	-32.8'	121.2°	35°51.4'	-33.7'	121.8°	35°19.5'	-34.6'	122.4°	34°47.1'	-35.5'	123.0°	13
14	37°23.2'	-30.6'	120.3°	36°52.7'	-31.5'	120.9°	36°21.5'	-32.4'	121.6°	35°49.8'	-33.4'	122.2°	35°17.6'	-34.2'	122.8°	34°44.8'	-35.1'	123.4°	34°11.6'	-36.0'	124.0°	14
15	36°52.7'	-31.1'	121.4°	36°21.2'	-32.1'	122.0°	35°49.1'	-33.0'	122.6°	35°16.5'	-33.9'	123.2°	34°43.4'	-34.7'	123.8°	34°09.7'	-35.6'	124.4°	33°35.6'	-36.4'	124.9°	15
16	36°21.5'	-31.7'	122.4°	35°49.1'	-32.6'	123.0°	35°16.1'	-33.5'	123.6°	34°42.6'	-34.4'	124.2°	34°08.6'	-35.2'	124.8°	33°34.2'	-36.0'	125.3°	32°59.2'	-36.8'	125.9°	16
17	35°49.8'	-32.2'	123.5°	35°16.5'	-33.1'	124.1°	34°42.6'	-34.0'	124.7°	34°08.3'	-34.8'	125.2°	33°33.4'	-35.7'	125.8°	32°58.1'	-36.5'	126.3°	32°22.4'	-37.2'	126.8°	17
18	35°17.6'	-32.8'	124.5°	34°43.4'	-33.6'	125.1°	34°08.6'	-34.5'	125.7°	33°33.4'	-35.3'	126.2°	32°57.8'	-36.1'	126.7°	32°21.7'	-36.9'	127.2°	31°45.2'	-37.6'	127.7°	18
19	34°44.8'	-33.3'	125.5°	34°09.7'	-34.1'	126.1°	33°34.2'	-34.9'	126.6°	32°58.1'	-35.7'	127.2°	32°21.7'	-36.5'	127.7°	31°44.8'	-37.3'	128.2°	31°07.5'	-38.0'	128.6°	19
20	34°11.6'	-33.8'	126.6°	33°35.6'	-34.6'	127.1°	32°59.2'	-35.4'	127.6°	32°22.4'	-36.2'	128.1°	31°45.2									

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

44° 316° LHA

Latitude CONTRARY to Declination

44° 316° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	44°15.8'	-20.7'	104.1°	44°00.8'	-22.0'	105.0°	43°44.8'	-23.3'	105.9°	43°27.9'	-24.6'	106.8°	43°10.0'	-25.8'	107.7°	42°51.3'	-27.0'	108.6°	42°31.7'	-28.2'	109.5°	0
1	43°55.1'	-21.6'	105.4°	43°38.8'	-22.9'	106.3°	43°21.5'	-24.2'	107.2°	43°03.3'	-25.4'	108.1°	42°44.2'	-26.6'	109.0°	42°24.3'	-27.8'	109.8°	42°03.5'	-28.9'	110.7°	1
2	43°33.5'	-22.5'	106.7°	43°15.9'	-23.7'	107.6°	42°57.3'	-25.0'	108.5°	42°37.9'	-26.2'	109.3°	42°17.6'	-27.4'	110.2°	41°56.5'	-28.5'	111.0°	41°34.5'	-29.7'	111.9°	2
3	43°11.1'	-23.3'	107.9°	42°52.2'	-24.5'	108.8°	42°32.4'	-25.8'	109.7°	42°11.7'	-26.9'	110.6°	41°50.3'	-28.1'	111.4°	41°28.0'	-29.2'	112.2°	41°04.9'	-30.3'	113.0°	3
4	42°47.8'	-24.1'	109.2°	42°27.6'	-25.3'	110.1°	42°06.6'	-26.5'	110.9°	41°44.8'	-27.7'	111.8°	41°22.2'	-28.8'	112.6°	40°58.7'	-29.9'	113.4°	40°34.5'	-31.0'	114.2°	4
5	42°23.7'	-24.9'	110.4°	42°02.3'	-26.1'	111.3°	41°40.1'	-27.3'	112.1°	41°17.1'	-28.4'	112.9°	40°53.3'	-29.5'	113.7°	40°28.8'	-30.6'	114.5°	40°03.5'	-31.6'	115.3°	5
6	41°58.8'	-25.7'	111.7°	41°36.2'	-26.9'	112.5°	41°12.8'	-28.0'	113.3°	40°48.7'	-29.1'	114.1°	40°23.8'	-30.2'	114.9°	39°58.2'	-31.2'	115.7°	39°31.9'	-32.3'	116.4°	6
7	41°33.1'	-26.4'	112.9°	41°09.3'	-27.6'	113.7°	40°44.9'	-28.7'	114.5°	40°19.6'	-29.8'	115.3°	39°53.7'	-30.8'	116.0°	39°27.0'	-31.9'	116.8°	38°59.6'	-32.9'	117.5°	7
8	41°06.6'	-27.2'	114.1°	40°41.8'	-28.3'	114.9°	40°16.2'	-29.4'	115.6°	39°49.9'	-30.4'	116.4°	39°22.8'	-31.5'	117.1°	38°55.1'	-32.5'	117.9°	38°26.8'	-33.4'	118.6°	8
9	40°39.4'	-27.9'	115.3°	40°13.5'	-29.0'	116.0°	39°46.8'	-30.0'	116.8°	39°19.4'	-31.1'	117.5°	38°51.4'	-32.1'	118.2°	38°22.7'	-33.0'	118.9°	37°53.3'	-34.0'	119.6°	9
10	40°11.6'	-28.6'	116.4°	39°44.5'	-29.6'	117.2°	39°16.8'	-30.7'	117.9°	38°48.4'	-31.7'	118.6°	38°19.3'	-32.6'	119.3°	37°49.6'	-33.6'	120.0°	37°19.3'	-34.5'	120.7°	10
11	39°43.0'	-29.2'	117.6°	39°14.9'	-30.3'	118.3°	38°46.1'	-31.3'	119.0°	38°16.7'	-32.3'	119.7°	37°46.7'	-33.2'	120.4°	37°16.0'	-34.1'	121.0°	36°44.8'	-35.1'	121.7°	11
12	39°13.7'	-29.9'	118.7°	38°44.6'	-30.9'	119.4°	38°14.8'	-31.9'	120.1°	37°44.4'	-32.8'	120.8°	37°13.4'	-33.8'	121.4°	36°41.9'	-34.7'	122.1°	36°09.7'	-35.6'	122.7°	12
13	38°43.9'	-30.5'	119.8°	38°13.7'	-31.5'	120.5°	37°43.0'	-32.5'	121.2°	37°11.6'	-33.4'	121.8°	36°39.7'	-34.3'	122.5°	36°07.2'	-35.2'	123.1°	35°34.2'	-36.0'	123.7°	13
14	38°13.3'	-31.1'	120.9°	37°42.2'	-32.1'	121.6°	37°10.5'	-33.0'	122.2°	36°38.2'	-33.9'	122.9°	36°05.4'	-34.8'	123.5°	35°32.0'	-35.7'	124.1°	34°58.2'	-36.5'	124.7°	14
15	37°42.2'	-31.7'	122.0°	37°10.1'	-32.6'	122.6°	36°37.5'	-33.6'	123.3°	36°04.3'	-34.4'	123.9°	35°30.6'	-35.3'	124.5°	34°56.4'	-36.1'	125.1°	34°21.7'	-36.9'	125.6°	15
16	37°10.5'	-32.3'	123.1°	36°37.5'	-33.2'	123.7°	36°03.9'	-34.1'	124.3°	35°29.9'	-34.9'	124.9°	34°55.3'	-35.8'	125.5°	34°20.2'	-36.6'	126.0°	33°44.7'	-37.4'	126.6°	16
17	36°38.2'	-32.8'	124.1°	36°04.3'	-33.7'	124.7°	35°29.9'	-34.6'	125.3°	34°54.9'	-35.4'	125.9°	34°19.5'	-36.2'	126.4°	33°43.6'	-37.0'	127.0°	33°07.3'	-37.8'	127.5°	17
18	36°05.4'	-33.4'	125.2°	35°30.6'	-34.2'	125.7°	34°55.3'	-35.1'	126.3°	34°19.5'	-35.9'	126.9°	33°43.3'	-36.7'	127.4°	33°06.6'	-37.4'	127.9°	32°29.5'	-38.2'	128.4°	18
19	35°32.0'	-33.9'	126.2°	34°56.4'	-34.7'	126.8°	34°20.2'	-35.5'	127.3°	33°43.6'	-36.3'	127.8°	33°06.6'	-37.1'	128.4°	32°29.2'	-37.8'	128.9°	31°51.3'	-38.6'	129.4°	19
20	34°58.2'	-34.4'	127.2°	34°21.7'	-35.2'	127.7°	33°44.7'	-36.0'	128.3°	33°07.3'	-36.8'	128.8°	32°29.5'	-37.5'	129.3°	31°51.3'	-38.2'	129.8°	31°12.8'	-38.9'	130.2°	20
21	34°23.8'	-34.8'	128.2°	33°46.5'	-35.6'	128.7°	33°08.7'	-36.4'	129.2°	32°30.6'	-37.2'	129.7°	31°52.0'	-37.9'	130.2°	31°13.1'	-38.6'	130.7°	30°33.8'	-39.3'	131.1°	21
22	33°48.9'	-35.3'	129.2°	33°10.8'	-36.1'	129.7°	32°32.3'	-36.8'	130.2°	31°53.4'	-37.6'	130.7°	31°14.1'	-38.3'	131.1°	30°34.5'	-39.0'	131.6°	29°54.5'	-39.6'	132.0°	22
23	33°13.6'	-35.8'	130.1°	32°34.8'	-36.5'	130.6°	31°55.5'	-37.2'	131.1°	31°15.8'	-37.9'	131.6°	30°35.9'	-38.6'	132.0°	29°55.5'	-39.3'	132.5°	29°14.9'	-40.0'	132.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

44° 316° LHA

Latitude CONTRARY to DECLINATION

44° 316° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

43° 317° LHA

Latitude CONTRARY to Declination

43° 317° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	45°12.2'	-21.1'	104.5°	44°56.7'	-22.4'	105.5°	44°40.2'	-23.7'	106.5°	44°22.7'	-25.0'	107.4°	44°04.3'	-26.2'	108.3°	43°45.0'	-27.4'	109.2°	43°24.8'	-28.6'	110.1°	0
1	44°51.2'	-22.0'	105.9°	44°34.3'	-23.3'	106.8°	44°16.5'	-24.5'	107.8°	43°57.8'	-25.8'	108.7°	43°38.1'	-27.0'	109.6°	43°17.5'	-28.2'	110.5°	42°56.1'	-29.4'	111.3°	1
2	44°29.2'	-22.9'	107.2°	44°11.1'	-24.1'	108.1°	43°52.0'	-25.4'	109.0°	43°32.0'	-26.6'	109.9°	43°11.1'	-27.8'	110.8°	42°49.3'	-29.0'	111.7°	42°26.7'	-30.1'	112.5°	2
3	44°06.4'	-23.7'	108.5°	43°46.9'	-25.0'	109.4°	43°26.6'	-26.2'	110.3°	43°05.4'	-27.4'	111.2°	42°43.3'	-28.5'	112.0°	42°20.4'	-29.7'	112.9°	41°56.6'	-30.8'	113.7°	3
4	43°42.7'	-24.6'	109.7°	43°22.0'	-25.8'	110.6°	43°00.4'	-27.0'	111.5°	42°38.0'	-28.1'	112.4°	42°14.7'	-29.3'	113.2°	41°50.7'	-30.4'	114.0°	41°25.9'	-31.5'	114.8°	4
5	43°18.1'	-25.4'	111.0°	42°56.2'	-26.6'	111.9°	42°33.4'	-27.7'	112.7°	42°09.8'	-28.9'	113.6°	41°45.4'	-30.0'	114.4°	41°20.3'	-31.1'	115.2°	40°54.4'	-32.1'	116.0°	5
6	42°52.7'	-26.2'	112.2°	42°29.6'	-27.3'	113.1°	42°05.7'	-28.5'	113.9°	41°41.0'	-29.6'	114.7°	41°15.5'	-30.7'	115.5°	40°49.2'	-31.7'	116.3°	40°22.2'	-32.8'	117.1°	6
7	42°26.6'	-26.9'	113.5°	42°02.3'	-28.1'	114.3°	41°37.2'	-29.2'	115.1°	41°11.4'	-30.3'	115.9°	40°44.8'	-31.3'	116.7°	40°17.5'	-32.4'	117.4°	39°49.5'	-33.4'	118.2°	7
8	41°59.6'	-27.7'	114.7°	41°34.2'	-28.8'	115.5°	41°08.0'	-29.9'	116.3°	40°41.1'	-30.9'	117.0°	40°13.5'	-32.0'	117.8°	39°45.1'	-33.0'	118.5°	39°16.1'	-34.0'	119.3°	8
9	41°32.0'	-28.4'	115.9°	41°05.4'	-29.5'	116.7°	40°38.1'	-30.6'	117.4°	40°10.2'	-31.6'	118.2°	39°41.5'	-32.6'	118.9°	39°12.2'	-33.6'	119.6°	38°42.2'	-34.5'	120.3°	9
10	41°03.6'	-29.1'	117.0°	40°35.9'	-30.2'	117.8°	40°07.6'	-31.2'	118.6°	39°38.6'	-32.2'	119.3°	39°08.9'	-33.2'	120.0°	38°38.6'	-34.1'	120.7°	38°07.7'	-35.1'	121.4°	10
11	40°34.4'	-29.8'	118.2°	40°05.8'	-30.8'	118.9°	39°36.4'	-31.8'	119.7°	39°06.4'	-32.8'	120.4°	38°35.7'	-33.8'	121.1°	38°04.5'	-34.7'	121.7°	37°32.6'	-35.6'	122.4°	11
12	40°04.7'	-30.5'	119.3°	39°34.9'	-31.5'	120.1°	39°04.6'	-32.4'	120.8°	38°33.6'	-33.4'	121.4°	38°02.0'	-34.3'	122.1°	37°29.8'	-35.2'	122.8°	36°57.0'	-36.1'	123.4°	12
13	39°34.2'	-31.1'	120.5°	39°03.5'	-32.1'	121.2°	38°32.1'	-33.0'	121.8°	38°00.2'	-33.9'	122.5°	37°27.6'	-34.9'	123.2°	36°54.6'	-35.7'	123.8°	36°20.9'	-36.6'	124.4°	13
14	39°03.1'	-31.7'	121.6°	38°31.4'	-32.7'	122.2°	37°59.1'	-33.6'	122.9°	37°26.2'	-34.5'	123.5°	36°52.8'	-35.4'	124.2°	36°18.8'	-36.2'	124.8°	35°44.3'	-37.1'	125.4°	14
15	38°31.4'	-32.3'	122.6°	37°58.8'	-33.2'	123.3°	37°25.5'	-34.1'	124.0°	36°51.7'	-35.0'	124.6°	36°17.4'	-35.9'	125.2°	35°42.6'	-36.7'	125.8°	35°07.3'	-37.5'	126.4°	15
16	37°59.1'	-32.9'	123.7°	37°25.5'	-33.8'	124.4°	36°51.4'	-34.7'	125.0°	36°16.7'	-35.5'	125.6°	35°41.6'	-36.3'	126.2°	35°05.9'	-37.2'	126.7°	34°29.8'	-37.9'	127.3°	16
17	37°26.2'	-33.4'	124.8°	36°51.7'	-34.3'	125.4°	36°16.7'	-35.2'	126.0°	35°41.2'	-36.0'	126.6°	35°05.2'	-36.8'	127.2°	34°28.7'	-37.6'	127.7°	33°51.8'	-38.4'	128.2°	17
18	36°52.8'	-34.0'	125.8°	36°17.4'	-34.8'	126.4°	35°41.6'	-35.7'	127.0°	35°05.2'	-36.5'	127.6°	34°28.4'	-37.3'	128.1°	33°51.2'	-38.0'	128.6°	33°13.5'	-38.8'	129.2°	18
19	36°18.8'	-34.5'	126.8°	35°42.6'	-35.3'	127.4°	35°05.9'	-36.1'	128.0°	34°28.7'	-36.9'	128.5°	33°51.2'	-37.7'	129.1°	33°13.1'	-38.4'	129.6°	32°34.7'	-39.1'	130.1°	19
20	35°44.3'	-35.0'	127.9°	35°07.3'	-35.8'	128.4°	34°29.8'	-36.6'	129.0°	33°51.8'	-37.4'	129.5°	33°13.5'	-38.1'	130.0°							

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

42° 318° LHA

Latitude CONTRARY to Declination

42° 318° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	46°08.5'	-21.4'	105.0°	45°52.5'	-22.8'	106.0°	45°35.4'	-24.1'	107.0°	45°17.4'	-25.4'	108.0°	44°58.4'	-26.6'	108.9°	44°38.4'	-27.9'	109.9°	44°17.6'	-29.1'	110.8°	0
1	45°47.1'	-22.4'	106.4°	45°29.7'	-23.7'	107.4°	45°11.3'	-25.0'	108.3°	44°52.0'	-26.2'	109.3°	44°31.7'	-27.4'	110.2°	44°10.6'	-28.7'	111.1°	43°48.5'	-29.8'	112.0°	1
2	45°24.7'	-23.3'	107.7°	45°06.1'	-24.6'	108.7°	44°46.4'	-25.8'	109.6°	44°25.8'	-27.0'	110.5°	44°04.3'	-28.2'	111.4°	43°41.9'	-29.4'	112.3°	43°18.7'	-30.6'	113.2°	2
3	45°01.5'	-24.2'	109.0°	44°41.5'	-25.4'	110.0°	44°20.6'	-26.6'	110.9°	43°58.8'	-27.8'	111.8°	43°36.1'	-29.0'	112.7°	43°12.5'	-30.2'	113.5°	42°48.1'	-31.3'	114.4°	3
4	44°37.4'	-25.0'	110.3°	44°16.1'	-26.2'	111.2°	43°53.9'	-27.4'	112.1°	43°30.9'	-28.6'	113.0°	43°07.0'	-29.8'	113.9°	42°42.4'	-30.9'	114.7°	42°16.9'	-32.0'	115.6°	4
5	44°12.4'	-25.8'	111.6°	43°49.9'	-27.0'	112.5°	43°26.5'	-28.2'	113.4°	43°02.3'	-29.4'	114.2°	42°37.3'	-30.5'	115.1°	42°11.5'	-31.6'	115.9°	41°44.9'	-32.6'	116.7°	5
6	43°46.5'	-26.7'	112.8°	43°22.8'	-27.8'	113.7°	42°58.3'	-29.0'	114.6°	42°32.9'	-30.1'	115.4°	42°06.8'	-31.2'	116.2°	41°39.9'	-32.2'	117.0°	41°12.3'	-33.3'	117.8°	6
7	43°19.9'	-27.4'	114.1°	42°55.0'	-28.6'	114.9°	42°29.3'	-29.7'	115.8°	42°02.8'	-30.8'	116.6°	41°35.6'	-31.8'	117.4°	41°07.7'	-32.9'	118.2°	40°39.0'	-33.9'	118.9°	7
8	42°52.4'	-28.2'	115.3°	42°26.4'	-29.3'	116.1°	41°59.6'	-30.4'	116.9°	41°32.0'	-31.5'	117.7°	41°03.8'	-32.5'	118.5°	40°34.8'	-33.5'	119.3°	40°05.1'	-34.5'	120.0°	8
9	42°24.2'	-28.9'	116.5°	41°57.1'	-30.0'	117.3°	41°29.2'	-31.1'	118.1°	41°00.6'	-32.1'	118.9°	40°31.3'	-33.1'	119.6°	40°01.3'	-34.1'	120.3°	39°30.7'	-35.1'	121.1°	9
10	41°55.3'	-29.7'	117.7°	41°27.0'	-30.7'	118.5°	40°58.1'	-31.8'	119.2°	40°28.5'	-32.8'	120.0°	39°58.1'	-33.7'	120.7°	39°27.2'	-34.7'	121.4°	38°55.6'	-35.6'	122.1°	10
11	41°25.6'	-30.4'	118.8°	40°56.3'	-31.4'	119.6°	40°26.3'	-32.4'	120.3°	39°55.7'	-33.4'	121.1°	39°24.4'	-34.3'	121.8°	38°52.5'	-35.2'	122.5°	38°20.0'	-36.1'	123.1°	11
12	40°55.2'	-31.0'	120.0°	40°24.9'	-32.0'	120.7°	39°53.9'	-33.0'	121.4°	39°22.3'	-34.0'	122.1°	38°50.1'	-34.9'	122.8°	38°17.3'	-35.8'	123.5°	37°43.9'	-36.6'	124.2°	12
13	40°24.2'	-31.7'	121.1°	39°52.9'	-32.7'	121.8°	39°20.9'	-33.6'	122.5°	38°48.4'	-34.5'	123.2°	38°15.2'	-35.4'	123.9°	37°41.5'	-36.3'	124.5°	37°07.2'	-37.1'	125.1°	13
14	39°52.5'	-32.3'	122.2°	39°20.2'	-33.2'	122.9°	38°47.3'	-34.2'	123.6°	38°13.9'	-35.1'	124.3°	37°39.8'	-35.9'	124.9°	37°05.2'	-36.8'	125.5°	36°30.1'	-37.6'	126.1°	14
15	39°20.2'	-32.9'	123.3°	38°47.0'	-33.8'	124.0°	38°13.2'	-34.7'	124.6°	37°38.8'	-35.6'	125.3°	37°03.9'	-36.4'	125.9°	36°28.4'	-37.3'	126.5°	35°52.5'	-38.1'	127.1°	15
16	38°47.3'	-33.5'	124.4°	38°13.2'	-34.4'	125.0°	37°38.4'	-35.3'	125.7°	37°03.2'	-36.1'	126.3°	36°27.4'	-36.9'	126.9°	35°51.1'	-37.7'	127.5°	35°14.4'	-38.5'	128.0°	16
17	38°13.9'	-34.1'	125.5°	37°38.8'	-34.9'	126.1°	37°03.2'	-35.8'	126.7°	36°27.1'	-36.6'	127.3°	35°50.5'	-37.4'	127.9°	35°13.4'	-38.2'	128.4°	34°35.9'	-38.9'	129.0°	17
18	37°39.8'	-34.6'	126.5°	37°03.9'	-35.4'	127.1°	36°27.4'	-36.3'	127.7°	35°50.5'	-37.1'	128.3°	35°13.1'	-37.8'	128.8°	34°35.2'	-38.6'	129.4°	33°57.0'	-39.3'	129.9°	18
19	37°05.2'	-35.1'	127.5°	36°28.4'	-35.9'	128.1°	35°51.1'	-36.7'	128.7°	35°13.4'	-37.5'	129.2°	34°35.2'	-38.3'	129.8°	33°56.6'	-39.0'	130.3°	33°17.6'	-39.7'	130.8°	19
20	36°30.1'	-35.6'	128.5°	35°52.5'	-36.4'	129.1°	35°14.4'	-37.2'	129.7°	34°35.9'	-38.0'	130.2°	33°57.0'	-38.7'	130.7°	33°17.6'	-39.4'	131.2°	32°37.9'	-40.1'	131.7°	20
21	35°54.5'	-36.1'	129.5°	35°16.0'	-36.9'	130.1°	34°37.2'	-37.6'	130.6°	33°57.9'	-38.4'	131.1°	33°18.3'	-39.1'	131.6°	32°38.2'	-39.8'	132.1°	31°57.8'	-40.5'	132.6°	21
22	35°18.3'	-36.6'	130.5°	34°39.2'	-37.3'	131.0°	33°59.6'	-38.1'	131.6°	33°19.6'	-38.8'	132.1°	32°39.2'	-39.5'	132.5°	31°58.4'	-40.1'	133.0°	31°17.3'	-40.8'	133.4°	22
23	34°41.8'	-37.0'	131.5°	34°01.8'	-37.8'	132.0°	33°21.5'	-38.5'	132.5°	32°40.8'	-39.2'	133.0°	31°59.7'	-39.8'	133.4°	31°18.3'	-40.5'	133.9°	30°36.5'	-41.1'	134.3°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

42° 318° LHA

Latitude CONTRARY to DECLINATION

42° 318° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

41° 319° LHA

Latitude CONTRARY to Declination

41° 319° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	47°04.7'	-21.8'	105.6°	46°48.1'	-23.2'	106.6°	46°30.5'	-24.5'	107.6°	46°11.9'	-25.8'	108.6°	45°52.2'	-27.1'	109.6°	45°31.7'	-28.3'	110.5°	45°10.2'	-29.5'	111.5°	0
1	46°42.9'	-22.8'	106.9°	46°25.0'	-24.1'	107.9°	46°06.0'	-25.4'	108.9°	45°46.1'	-26.7'	109.9°	45°25.2'	-27.9'	110.8°	45°03.4'	-29.1'	111.8°	44°40.7'	-30.3'	112.7°	1
2	46°20.1'	-23.7'	108.3°	46°00.9'	-25.0'	109.2°	45°40.6'	-26.3'	110.2°	45°19.4'	-27.5'	111.2°	44°57.3'	-28.7'	112.1°	44°34.3'	-29.9'	113.0°	44°10.4'	-31.0'	113.9°	2
3	45°56.5'	-24.6'	109.6°	45°35.9'	-25.9'	110.6°	45°14.4'	-27.1'	111.5°	44°51.9'	-28.3'	112.4°	44°28.6'	-29.5'	113.3°	44°04.4'	-30.6'	114.2°	43°39.3'	-31.8'	115.1°	3
4	45°31.9'	-25.5'	110.9°	45°10.0'	-26.7'	111.8°	44°47.2'	-27.9'	112.8°	44°23.6'	-29.1'	113.7°	43°59.1'	-30.3'	114.6°	43°33.7'	-31.4'	115.4°	43°07.6'	-32.5'	116.3°	4
5	45°06.4'	-26.3'	112.2°	44°43.3'	-27.5'	113.1°	44°19.3'	-28.7'	114.0°	43°54.5'	-29.9'	114.9°	43°28.8'	-31.0'	115.7°	43°02.4'	-32.1'	116.6°	42°35.1'	-33.1'	117.4°	5
6	44°40.1'	-27.2'	113.4°	44°15.7'	-28.3'	114.3°	43°50.6'	-29.5'	115.2°	43°24.6'	-30.6'	116.1°	42°57.8'	-31.7'	116.9°	42°30.3'	-32.8'	117.7°	42°02.0'	-33.8'	118.5°	6
7	44°12.9'	-28.0'	114.7°	43°47.4'	-29.1'	115.6°	43°21.1'	-30.2'	116.4°	42°54.0'	-31.3'	117.3°	42°26.1'	-32.4'	118.1°	41°57.5'	-33.4'	118.9°	41°28.2'	-34.4'	119.7°	7
8	43°44.9'	-28.7'	115.9°	43°18.3'	-29.9'	116.8°	42°50.9'	-31.0'	117.6°	42°22.7'	-32.0'	118.4°	41°53.8'	-33.0'	119.2°	41°24.1'	-34.0'	120.0°	40°53.8'	-35.0'	120.7°	8
9	43°16.2'	-29.5'	117.1°	42°48.4'	-30.6'	118.0°	42°19.9'	-31.7'	118.8°	41°50.7'	-32.7'	119.6°	41°20.7'	-33.7'	120.3°	40°50.1'	-34.7'	121.1°	40°18.8'	-35.6'	121.8°	9
10	42°46.7'	-30.2'	118.3°	42°17.8'	-31.3'	119.1°	41°48.3'	-32.3'	119.9°	41°18.0'	-33.3'	120.7°	40°47.0'	-34.3'	121.4°	40°15.4'	-35.2'	122.2°	39°43.2'	-36.2'	122.9°	10
11	42°16.4'	-30.9'	119.5°	41°46.5'	-32.0'	120.3°	41°15.9'	-33.0'	121.0°	40°44.7'	-33.9'	121.8°	40°12.7'	-34.9'	122.5°	39°40.2'	-35.8'	123.2°	39°07.0'	-36.7'	123.9°	11
12	41°45.5'	-31.6'	120.7°	41°14.6'	-32.6'	121.4°	40°43.0'	-33.6'	122.2°	40°10.7'	-34.5'	122.9°	39°37.8'	-35.5'	123.6°	39°04.4'	-36.3'	124.2°	38°30.3'	-37.2'	124.9°	12
13	41°13.9'	-32.3'	121.8°	40°42.0'	-33.2'	122.5°	40°09.4'	-34.2'	123.2°	39°36.2'	-35.1'	123.9°	39°02.4'	-36.0'	124.6°	38°28.0'	-36.9'	125.3°	37°53.1'	-37.7'	125.9°	13
14	40°41.6'	-32.9'	122.9°	40°08.7'	-33.9'	123.6°	39°35.2'	-34.8'	124.3°	39°01.1'	-35.7'	125.0°	38°26.4'	-36.5'	125.6°	37°51.2'	-37.4'	126.3°	37°15.4'	-38.2'	126.9°	14
15	40°08.7'	-33.5'	124.0°	39°34.9'	-34.4'	124.7°	39°00.4'	-35.3'	125.4°	38°25.4'	-36.2'	126.0°	37°49.9'	-37.0'	126.6°	37°13.8'	-37.9'	127.3°	36°37.2'	-38.6'	127.9°	15
16	39°35.2'	-34.1'	125.1°	39°00.4'	-35.0'	125.8°	38°25.1'	-35.9'	126.4°	37°49.2'	-36.7'	127.0°	37°12.8'	-37.5'	127.6°	36°35.9'	-38.3'	128.2°	35°58.6'	-39.1'	128.8°	16
17	39°01.1'	-34.7'	126.1°	38°25.4'	-35.5'	126.8°	37°49.2'	-36.4'	127.4°	37°12.5'	-37.2'	128.0°	36°35.3'	-38.0'	128.6°	35°57.6'	-38.8'	129.2°	35°19.5'	-39.5'	129.7°	17
18	38°26.4'	-35.2'	127.2°	37°49.9'	-36.1'	127.8°	37°12.8'	-36.9'	128.4°	36°35.3'	-37.7'	129.0°	35°57.3'	-38.4'	129.6°	35°18.9'	-39.2'	130.1°	34°40.0'	-39.9'	130.7°	18
19	37°51.2'	-35.8'	128.2°	37°13.8'	-36.6'	128.8°	36°35.9'	-37.4'	129.4°	35°57.6'	-38.1'	130.0°	35°18.9'	-38.9'	130.5°	34°39.7'	-39.6'	131.0°	34°00.1'	-40.3'	131.6°	19
20	37°15.4'	-36.3'	129.2°	36°37.2'	-37.1'	129.8°	35°58.6'	-37.8'	130.4°	35°19.5'	-38.6'	130.9°	34°40.0'	-39.3'								

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

40° 320° LHA

Latitude CONTRARY to Declination

40° 320° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	48°00.7'	-22.2'	106.1°	47°43.6'	-23.6'	107.1°	47°25.4'	-24.9'	108.2°	47°06.1'	-26.2'	109.2°	46°45.9'	-27.5'	110.2°	46°24.7'	-28.8'	111.2°	46°02.5'	-30.0'	112.2°	0
1	47°38.5'	-23.2'	107.5°	47°20.0'	-24.5'	108.5°	47°00.5'	-25.8'	109.5°	46°39.9'	-27.1'	110.5°	46°18.4'	-28.4'	111.5°	45°55.9'	-29.6'	112.5°	45°32.5'	-30.8'	113.4°	1
2	47°15.3'	-24.1'	108.8°	46°55.5'	-25.5'	109.8°	46°34.6'	-26.7'	110.8°	46°12.8'	-28.0'	111.8°	45°50.0'	-29.2'	112.8°	45°26.3'	-30.4'	113.7°	45°01.8'	-31.5'	114.6°	2
3	46°51.2'	-25.1'	110.2°	46°30.0'	-26.3'	111.2°	46°07.9'	-27.6'	112.1°	45°44.8'	-28.8'	113.1°	45°20.8'	-30.0'	114.0°	44°56.0'	-31.1'	114.9°	44°30.2'	-32.3'	115.8°	3
4	46°26.2'	-26.0'	111.5°	46°03.7'	-27.2'	112.5°	45°40.3'	-28.4'	113.4°	45°16.0'	-29.6'	114.3°	44°50.8'	-30.8'	115.3°	44°24.8'	-31.9'	116.1°	43°58.0'	-33.0'	117.0°	4
5	46°00.2'	-26.8'	112.8°	45°36.5'	-28.1'	113.7°	45°11.9'	-29.2'	114.7°	44°46.4'	-30.4'	115.6°	44°20.1'	-31.5'	116.5°	43°52.9'	-32.6'	117.3°	43°25.0'	-33.7'	118.2°	5
6	45°33.3'	-27.7'	114.1°	45°08.4'	-28.9'	115.0°	44°42.6'	-30.0'	115.9°	44°16.0'	-31.2'	116.8°	43°48.6'	-32.2'	117.6°	43°20.3'	-33.3'	118.5°	42°51.3'	-34.3'	119.3°	6
7	45°05.6'	-28.5'	115.3°	44°39.5'	-29.7'	116.2°	44°12.6'	-30.8'	117.1°	43°44.8'	-31.9'	118.0°	43°16.3'	-32.9'	118.8°	42°47.0'	-34.0'	119.6°	42°17.0'	-35.0'	120.4°	7
8	44°37.1'	-29.3'	116.6°	44°09.9'	-30.4'	117.5°	43°41.8'	-31.5'	118.3°	43°13.0'	-32.6'	119.1°	42°43.4'	-33.6'	120.0°	42°13.1'	-34.6'	120.7°	41°42.0'	-35.6'	121.5°	8
9	44°07.8'	-30.1'	117.8°	43°39.4'	-31.2'	118.7°	43°10.3'	-32.2'	119.5°	42°40.4'	-33.3'	120.3°	42°09.8'	-34.2'	121.1°	41°38.5'	-35.2'	121.8°	41°06.5'	-36.2'	122.6°	9
10	43°37.8'	-30.8'	119.0°	43°08.3'	-31.9'	119.8°	42°38.1'	-32.9'	120.6°	42°07.1'	-33.9'	121.4°	41°35.5'	-34.9'	122.2°	41°03.2'	-35.8'	122.9°	40°30.3'	-36.7'	123.6°	10
11	43°06.9'	-31.5'	120.2°	42°36.4'	-32.6'	121.0°	42°05.2'	-33.6'	121.8°	41°33.2'	-34.5'	122.5°	41°00.7'	-35.5'	123.3°	40°27.4'	-36.4'	124.0°	39°53.6'	-37.3'	124.7°	11
12	42°35.4'	-32.2'	121.3°	42°03.8'	-33.2'	122.1°	41°31.6'	-34.2'	122.9°	40°58.7'	-35.1'	123.6°	40°25.2'	-36.0'	124.3°	39°51.1'	-36.9'	125.0°	39°16.3'	-37.8'	125.7°	12
13	42°03.2'	-32.9'	122.5°	41°30.6'	-33.9'	123.2°	40°57.4'	-34.8'	124.0°	40°23.6'	-35.7'	124.7°	39°49.1'	-36.6'	125.4°	39°14.1'	-37.5'	126.0°	38°38.5'	-38.3'	126.7°	13
14	41°30.3'	-33.5'	123.6°	40°56.8'	-34.5'	124.3°	40°22.6'	-35.4'	125.0°	39°47.9'	-36.3'	125.7°	39°12.5'	-37.1'	126.4°	38°36.7'	-38.0'	127.0°	38°00.3'	-38.8'	127.7°	14
15	40°56.8'	-34.2'	124.7°	40°22.3'	-35.1'	125.4°	39°47.2'	-35.9'	126.1°	39°11.6'	-36.8'	126.8°	38°35.4'	-37.6'	127.4°	37°58.7'	-38.4'	128.0°	37°21.5'	-39.2'	128.6°	15
16	40°22.6'	-34.7'	125.8°	39°47.2'	-35.6'	126.5°	39°11.3'	-36.5'	127.1°	38°34.8'	-37.3'	127.8°	37°57.8'	-38.1'	128.4°	37°20.3'	-38.9'	129.0°	36°42.3'	-39.7'	129.6°	16
17	39°47.9'	-35.3'	126.9°	39°11.6'	-36.2'	127.5°	38°34.8'	-37.0'	128.2°	37°57.5'	-37.8'	128.8°	37°19.6'	-38.6'	129.4°	36°41.3'	-39.4'	130.0°	36°02.6'	-40.1'	130.5°	17
18	39°12.5'	-35.9'	127.9°	38°35.4'	-36.7'	128.5°	37°57.8'	-37.5'	129.2°	37°19.6'	-38.3'	129.8°	36°41.0'	-39.1'	130.3°	36°02.0'	-39.8'	130.9°	35°22.5'	-40.5'	131.4°	18
19	38°36.7'	-36.4'	128.9°	37°58.7'	-37.2'	129.6°	37°20.3'	-38.0'	130.1°	36°41.3'	-38.8'	130.7°	36°02.0'	-39.5'	131.3°	35°22.2'	-40.2'	131.8°	34°42.0'	-40.9'	132.3°	19
20	38°00.3'	-36.9'	130.0°	37°21.5'	-37.7'	130.5°	36°42.3'	-38.5'	131.1°	36°02.6'	-39.2'	131.7°	35°22.5'	-39.9'	132.2°	34°42.0'	-40.6'	132.7°	34°01.1'	-41.3'	133.2°	20
21	37°23.3'	-37.4'	131.0°	36°43.8'	-38.2'	131.5°	36°03.8'	-38.9'	132.1°	35°23.4'	-39.6'	132.6°	34°42.6'	-40.3'	133.1°	34°01.4'	-41.0'	133.6°	33°19.8'	-41.6'	134.1°	21
22	36°45.9'	-37.9'	131.9°	36°05.6'	-38.6'	132.5°	35°24.9'	-39.3'	133.0°	34°43.8'	-40.0'	133.5°	34°02.3'	-40.7'	134.0°	33°20.4'	-41.3'	134.5°	32°38.2'	-42.0'	134.9°	22
23	36°08.0'	-38.3'	132.9°	35°27.0'	-39.1'	133.4°	34°45.6'	-39.7'	133.9°	34°03.8'	-40.4'	134.4°	33°21.6'	-41.1'	134.9°	32°39.1'	-41.7'	135.4°	31°56.2'	-42.3'	135.8°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

40° 320° LHA

Latitude CONTRARY to DECLINATION

40° 320° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

39° 321° LHA

Latitude CONTRARY to Declination

39° 321° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	48°56.6'	-22.6'	106.6°	48°38.9'	-24.0'	107.7°	48°20.1'	-25.4'	108.8°	48°00.2'	-26.7'	109.9°	47°39.3'	-28.0'	110.9°	47°17.4'	-29.2'	111.9°	46°54.6'	-30.5'	112.9°	0
1	48°33.9'	-23.6'	108.0°	48°14.9'	-25.0'	109.1°	47°54.7'	-26.3'	110.2°	47°33.5'	-27.6'	111.2°	47°11.4'	-28.9'	112.2°	46°48.2'	-30.1'	113.2°	46°24.1'	-31.3'	114.2°	1
2	48°10.3'	-24.6'	109.4°	47°49.9'	-25.9'	110.5°	47°28.4'	-27.2'	111.5°	47°05.9'	-28.5'	112.5°	46°42.5'	-29.7'	113.5°	46°18.1'	-30.9'	114.4°	45°52.9'	-32.0'	115.4°	2
3	47°45.8'	-25.6'	110.8°	47°24.0'	-26.8'	111.8°	47°01.2'	-28.1'	112.8°	46°37.5'	-29.3'	113.8°	46°12.8'	-30.5'	114.7°	45°47.3'	-31.7'	115.7°	45°20.8'	-32.8'	116.6°	3
4	47°20.2'	-26.5'	112.1°	46°57.1'	-27.7'	113.1°	46°33.1'	-29.0'	114.1°	46°08.1'	-30.1'	115.0°	45°42.3'	-31.3'	116.0°	45°15.6'	-32.4'	116.9°	44°48.0'	-33.5'	117.8°	4
5	46°53.7'	-27.4'	113.4°	46°29.4'	-28.6'	114.4°	46°04.1'	-29.8'	115.4°	45°38.0'	-30.9'	116.3°	45°11.0'	-32.1'	117.2°	44°43.2'	-33.2'	118.1°	44°14.5'	-34.2'	118.9°	5
6	46°26.3'	-28.2'	114.7°	46°00.8'	-29.4'	115.7°	45°34.3'	-30.6'	116.6°	45°07.1'	-31.7'	117.5°	44°38.9'	-32.8'	118.4°	44°10.0'	-33.9'	119.2°	43°40.3'	-34.9'	120.1°	6
7	45°58.1'	-29.1'	116.0°	45°31.4'	-30.2'	116.9°	45°03.8'	-31.4'	117.8°	44°35.3'	-32.4'	118.7°	44°06.1'	-33.5'	119.6°	43°36.2'	-34.5'	120.4°	43°05.4'	-35.5'	121.2°	7
8	45°29.0'	-29.9'	117.3°	45°01.1'	-31.0'	118.2°	44°32.4'	-32.1'	119.0°	44°02.9'	-33.2'	119.9°	43°32.6'	-34.2'	120.7°	43°01.6'	-35.2'	121.5°	42°29.9'	-36.1'	122.3°	8
9	44°59.2'	-30.7'	118.5°	44°30.1'	-31.8'	119.4°	44°00.3'	-32.8'	120.2°	43°29.7'	-33.8'	121.0°	42°58.5'	-34.8'	121.8°	42°26.5'	-35.8'	122.6°	41°53.8'	-36.7'	123.4°	9
10	44°28.5'	-31.4'	119.7°	43°58.4'	-32.5'	120.6°	43°27.5'	-33.5'	121.4°	42°55.9'	-34.5'	122.2°	42°23.6'	-35.5'	122.9°	41°50.7'	-36.4'	123.7°	41°17.0'	-37.3'	124.4°	10
11	43°57.1'	-32.1'	120.9°	43°25.9'	-33.2'	121.7°	42°54.0'	-34.2'	122.5°	42°21.4'	-35.1'	123.3°	41°48.2'	-36.1'	124.0°	41°14.3'	-37.0'	124.8°	40°39.7'	-37.8'	125.5°	11
12	43°24.9'	-32.8'	122.1°	42°52.7'	-33.8'	122.9°	42°19.8'	-34.8'	123.6°	41°46.3'	-35.7'	124.4°	41°12.1'	-36.6'	125.1°	40°37.3'	-37.5'	125.8°	40°01.9'	-38.4'	126.5°	12
13	42°52.1'	-33.5'	123.2°	42°18.9'	-34.5'	124.0°	41°45.0'	-35.4'	124.7°	41°10.5'	-36.3'	125.4°	40°35.4'	-37.2'	126.1°	39°59.8'	-38.1'	126.8°	39°23.5'	-38.9'	127.5°	13
14	42°18.6'	-34.2'	124.3°	41°44.4'	-35.1'	125.1°	41°09.6'	-36.0'	125.8°	40°34.2'	-36.9'	126.5°	39°58.2'	-37.7'	127.2°	39°21.7'	-38.6'	127.8°	38°44.6'	-39.4'	128.5°	14
15	41°44.4'	-34.8'	125.4°	41°09.3'	-35.7'	126.2°	40°33.6'	-36.6'	126.9°	39°57.3'	-37.4'	127.5°	39°20.5'	-38.3'	128.2°	38°43.2'	-39.0'	128.8°	38°05.3'	-39.8'	129.4°	15
16	41°09.6'	-35.4'	126.5°	40°33.6'	-36.3'	127.2°	39°57.0'	-37.1'	127.9°	39°19.9'	-37.9'	128.5°	38°42.3'	-38.7'	129.2°	38°04.1'	-39.5'	129.8°	37°25.5'	-40.3'	130.4°	16
17	40°34.2'	-36.0'	127.6°	39°57.3'	-36.8'	128.3°	39°19.9'	-37.6'	128.9°	38°42.0'	-38.4'	129.5°	38°03.5'	-39.2'	130.2°	37°24.6'	-40.0'	130.7°	36°45.2'	-40.7'	131.3°	17
18	39°58.2'	-36.5'	128.6°	39°20.5'	-37.4'	129.3°	38°42.3'	-38.2'	129.9°	38°03.5'	-38.9'	130.5°	37°24.3'	-39.7'	131.1°	36°44.6'	-40.4'	131.7°	36°04.5'	-41.1'	132.2°	18
19	39°21.7'	-37.1'	129.7°	38°43.2'	-37.9'	130.3°	38°04.1'	-38.6'	130.9°	37°24.6'	-39.4'	131.5°	36°44.6'	-40.1'	132.0°	36°04.2'	-40.8'	132.6°	35°23.4'	-41.5'	133.1°	19
20	38°44.6'	-37.6'	130.7°	38°05.3'	-38.4'	131.3°	37°25.5'	-39.1'	131.9°	36°45.2'	-39.8'	132.4°	36°04.5'	-40.5'								

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

38° 322° LHA

Latitude CONTRARY to Declination

38° 322° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	49°52.3'	-23.1'	107.2°	49°34.0'	-24.5'	108.3°	49°14.6'	-25.8'	109.4°	48°54.1'	-27.2'	110.5°	48°32.5'	-28.5'	111.6°	48°10.0'	-29.7'	112.6°	47°46.4'	-31.0'	113.6°	0
1	49°29.2'	-24.1'	108.6°	49°09.5'	-25.5'	109.7°	48°48.8'	-26.8'	110.8°	48°26.9'	-28.1'	111.9°	48°04.1'	-29.4'	112.9°	47°40.2'	-30.6'	113.9°	47°15.4'	-31.8'	114.9°	1
2	49°05.1'	-25.1'	110.0°	48°44.1'	-26.4'	111.1°	48°22.0'	-27.7'	112.2°	47°58.8'	-29.0'	113.2°	47°34.7'	-30.2'	114.2°	47°09.6'	-31.4'	115.2°	46°43.6'	-32.6'	116.2°	2
3	48°40.1'	-26.1'	111.4°	48°17.7'	-27.4'	112.5°	47°54.2'	-28.6'	113.5°	47°29.8'	-29.9'	114.5°	47°04.5'	-31.1'	115.5°	46°38.2'	-32.2'	116.4°	46°11.1'	-33.3'	117.4°	3
4	48°14.0'	-27.0'	112.8°	47°50.3'	-28.3'	113.8°	47°25.6'	-29.5'	114.8°	46°60.0'	-30.7'	115.8°	46°33.4'	-31.9'	116.7°	46°06.0'	-33.0'	117.7°	45°37.7'	-34.1'	118.6°	4
5	47°47.0'	-27.9'	114.1°	47°22.0'	-29.2'	115.1°	46°56.1'	-30.3'	116.1°	46°29.3'	-31.5'	117.0°	46°01.6'	-32.6'	118.0°	45°33.0'	-33.7'	118.9°	45°03.7'	-34.8'	119.7°	5
6	47°19.1'	-28.8'	115.4°	46°52.9'	-30.0'	116.4°	46°25.8'	-31.2'	117.3°	45°57.8'	-32.3'	118.3°	45°28.9'	-33.4'	119.2°	44°59.3'	-34.4'	120.0°	44°28.9'	-35.4'	120.9°	6
7	46°50.3'	-29.7'	116.7°	46°22.9'	-30.8'	117.7°	45°54.6'	-31.9'	118.6°	45°25.5'	-33.0'	119.5°	44°55.6'	-34.1'	120.3°	44°24.9'	-35.1'	121.2°	43°53.5'	-36.1'	122.0°	7
8	46°20.6'	-30.5'	118.0°	45°52.1'	-31.6'	118.9°	45°22.7'	-32.7'	119.8°	44°52.5'	-33.7'	120.6°	44°21.5'	-34.8'	121.5°	43°49.8'	-35.8'	122.3°	43°17.4'	-36.7'	123.1°	8
9	45°50.1'	-31.3'	119.2°	45°20.4'	-32.4'	120.1°	44°50.0'	-33.4'	121.0°	44°18.7'	-34.4'	121.8°	43°46.7'	-35.4'	122.6°	43°14.0'	-36.4'	123.4°	42°40.6'	-37.3'	124.2°	9
10	45°18.9'	-32.0'	120.4°	44°48.1'	-33.1'	121.3°	44°16.5'	-34.1'	122.1°	43°44.3'	-35.1'	122.9°	43°11.3'	-36.1'	123.7°	42°37.6'	-37.0'	124.5°	42°03.3'	-37.9'	125.3°	10
11	44°46.8'	-32.8'	121.6°	44°15.0'	-33.8'	122.5°	43°42.4'	-34.8'	123.3°	43°09.2'	-35.7'	124.1°	42°35.2'	-36.7'	124.8°	42°00.6'	-37.6'	125.6°	41°25.4'	-38.4'	126.3°	11
12	44°14.1'	-33.5'	122.8°	43°41.2'	-34.5'	123.6°	43°07.6'	-35.4'	124.4°	42°33.4'	-36.4'	125.2°	41°58.6'	-37.3'	125.9°	41°23.1'	-38.1'	126.6°	40°47.0'	-39.0'	127.3°	12
13	43°40.6'	-34.2'	124.0°	43°06.7'	-35.1'	124.7°	42°32.2'	-36.1'	125.5°	41°57.1'	-36.9'	126.2°	41°21.3'	-37.8'	126.9°	40°44.9'	-38.7'	127.6°	40°08.0'	-39.5'	128.3°	13
14	43°06.4'	-34.8'	125.1°	42°31.6'	-35.7'	125.8°	41°56.2'	-36.6'	126.6°	41°20.1'	-37.5'	127.3°	40°43.5'	-38.4'	128.0°	40°06.3'	-39.2'	128.6°	39°28.5'	-40.0'	129.3°	14
15	42°31.6'	-35.4'	126.2°	41°55.9'	-36.3'	126.9°	41°19.5'	-37.2'	127.6°	40°42.6'	-38.1'	128.3°	40°05.1'	-38.9'	129.0°	39°27.1'	-39.7'	129.6°	38°48.6'	-40.4'	130.3°	15
16	41°56.2'	-36.1'	127.3°	41°19.5'	-36.9'	128.0°	40°42.3'	-37.8'	128.7°	40°04.5'	-38.3'	129.7°	39°26.0'	-39.1'	130.3°	38°46.9'	-39.8'	131.0°	38°07.3'	-40.6'	131.5°	16
17	41°20.1'	-36.6'	128.4°	40°42.6'	-37.5'	129.0°	40°04.5'	-38.3'	129.7°	39°26.0'	-39.1'	130.3°	38°46.9'	-39.8'	131.0°	38°07.0'	-40.3'	131.9°	37°26.7'	-41.0'	132.5°	17
18	40°43.5'	-37.2'	129.4°	40°05.1'	-38.0'	130.1°	39°26.2'	-38.8'	130.7°	38°46.9'	-39.6'	131.3°	38°07.0'	-40.3'	131.9°	37°26.7'	-41.0'	132.5°	36°46.0'	-41.7'	133.0°	18
19	40°06.3'	-37.7'	130.4°	39°27.1'	-38.5'	131.1°	38°47.4'	-39.3'	131.7°	38°07.3'	-40.0'	132.3°	37°26.7'	-40.7'	132.8°	36°45.7'	-41.4'	133.4°	36°04.3'	-42.1'	133.9°	19
20	39°28.5'	-38.3'	131.5°	38°48.6'	-39.0'	132.1°	38°08.2'	-39.8'	132.6°	37°27.3'	-40.5'	133.2°	36°46.0'	-41.2'	133.8°	36°04.3'	-41.8'	134.3°	35°22.7'	-42.5'	134.8°	20
21	38°50.3'	-38.7'	132.4°	38°09.6'	-39.5'	133.0°	37°28.4'	-40.2'	133.6°	36°46.8'	-40.9'	134.1°	36°04.8'	-41.6'	134.7°	35°22.5'	-42.2'	135.2°	34°39.7'	-42.8'	135.7°	21
22	38°11.5'	-39.2'	133.4°	37°30.1'	-39.9'	134.0°	36°48.2'	-40.6'	134.5°	36°05.9'	-41.3'	135.1°	35°23.3'	-41.9'	135.6°	34°40.3'	-42.6'	136.0°	33°56.9'	-43.2'	136.5°	22
23	37°32.3'	-39.7'	134.4°	36°50.1'	-40.4'	134.9°	36°07.6'	-41.0'	135.4°	35°24.6'	-41.7'	135.9°	34°41.3'	-42.3'	136.4°	33°57.7'	-42.9'	136.9°	33°13.7'	-43.5'	137.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

38° 322° LHA

Latitude CONTRARY to DECLINATION

38° 322° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

37° 323° LHA

Latitude CONTRARY to Declination

37° 323° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	50°47.8'	-23.5'	107.8°	50°28.9'	-24.9'	109.0°	50°08.9'	-26.3'	110.1°	49°47.7'	-27.7'	111.2°	49°25.5'	-29.0'	112.3°	49°02.2'	-30.2'	113.4°	48°37.9'	-31.5'	114.4°	0
1	50°24.3'	-24.6'	109.2°	50°04.0'	-26.0'	110.4°	49°42.5'	-27.3'	111.5°	49°20.0'	-28.6'	112.6°	48°56.5'	-29.9'	113.6°	48°31.9'	-31.1'	114.7°	48°06.4'	-32.3'	115.7°	1
2	49°59.7'	-25.6'	110.7°	49°38.0'	-26.9'	111.8°	49°15.2'	-28.3'	112.9°	48°51.4'	-29.5'	113.9°	48°26.6'	-30.8'	115.0°	48°00.8'	-32.0'	116.0°	47°34.1'	-33.1'	116.9°	2
3	49°34.2'	-26.6'	112.1°	49°11.1'	-27.9'	113.2°	48°47.0'	-29.2'	114.2°	48°21.9'	-30.4'	115.2°	47°55.8'	-31.6'	116.2°	47°28.8'	-32.8'	117.2°	47°01.0'	-33.9'	118.2°	3
4	49°07.6'	-27.6'	113.5°	48°43.2'	-28.8'	114.5°	48°17.8'	-30.1'	115.5°	47°51.5'	-31.3'	116.5°	47°24.2'	-32.4'	117.5°	46°56.1'	-33.6'	118.5°	46°27.1'	-34.6'	119.4°	4
5	48°40.0'	-28.5'	114.8°	48°14.3'	-29.7'	115.8°	47°47.7'	-30.9'	116.8°	47°20.2'	-32.1'	117.8°	46°51.8'	-33.2'	118.7°	46°22.5'	-34.3'	119.7°	45°52.4'	-35.4'	120.6°	5
6	48°11.5'	-29.4'	116.1°	47°44.6'	-30.6'	117.1°	47°16.8'	-31.7'	118.1°	46°48.1'	-32.9'	119.0°	46°18.6'	-34.0'	119.9°	45°48.2'	-35.0'	120.8°	45°17.1'	-36.0'	121.7°	6
7	47°42.1'	-30.3'	117.4°	47°14.0'	-31.4'	118.4°	46°45.1'	-32.5'	119.3°	46°15.3'	-33.6'	120.2°	45°44.6'	-34.7'	121.1°	45°13.2'	-35.7'	122.0°	44°41.0'	-36.7'	122.8°	7
8	47°11.9'	-31.1'	118.7°	46°42.6'	-32.2'	119.6°	46°12.5'	-33.3'	120.6°	45°41.6'	-34.4'	121.4°	45°09.9'	-35.4'	122.3°	44°37.5'	-36.4'	123.1°	44°04.4'	-37.3'	124.0°	8
9	46°40.8'	-31.9'	120.0°	46°10.4'	-33.0'	120.9°	45°39.2'	-34.0'	121.7°	45°07.3'	-35.1'	122.6°	44°34.6'	-36.0'	123.4°	44°01.1'	-37.0'	124.3°	43°27.0'	-37.9'	125.0°	9
10	46°08.9'	-32.7'	121.2°	45°37.4'	-33.7'	122.1°	45°05.2'	-34.7'	122.9°	44°32.2'	-35.7'	123.8°	43°58.5'	-36.7'	124.6°	43°24.1'	-37.6'	125.3°	42°49.1'	-38.5'	126.1°	10
11	45°36.2'	-33.4'	122.4°	45°03.7'	-34.4'	123.2°	44°30.4'	-35.4'	124.1°	43°56.5'	-36.4'	124.9°	43°21.8'	-37.3'	125.7°	42°46.5'	-38.2'	126.4°	42°10.6'	-39.0'	127.1°	11
12	45°02.8'	-34.1'	123.6°	44°29.3'	-35.1'	124.4°	43°55.0'	-36.1'	125.2°	43°20.1'	-37.0'	126.0°	42°44.5'	-37.9'	126.7°	42°08.4'	-38.7'	127.5°	41°31.6'	-39.6'	128.2°	12
13	44°28.7'	-34.8'	124.7°	43°54.1'	-35.8'	125.5°	43°18.9'	-36.7'	126.3°	42°43.1'	-37.6'	127.0°	42°06.6'	-38.4'	127.8°	41°29.6'	-39.3'	128.5°	40°52.0'	-40.1'	129.2°	13
14	43°53.8'	-35.5'	125.9°	43°18.4'	-36.4'	126.6°	42°42.2'	-37.3'	127.4°	42°05.5'	-38.2'	128.1°	41°28.2'	-39.0'	128.8°	40°50.3'	-39.8'	129.5°	40°11.9'	-40.6'	130.1°	14
15	43°18.4'	-36.1'	127.0°	42°42.0'	-37.0'	127.7°	42°04.9'	-37.9'	128.4°	41°27.4'	-38.7'	129.1°	40°49.2'	-39.5'	129.8°	40°10.5'	-40.3'	130.5°	39°31.3'	-41.0'	131.1°	15
16	42°42.2'	-36.7'	128.1°	42°04.9'	-37.6'	128.8°	41°27.1'	-38.4'	129.5°	40°48.7'	-39.2'	130.2°	40°09.7'	-40.0'	130.8°	39°30.2'	-40.8'	131.4°	38°50.3'	-41.5'	132.0°	16
17	42°05.5'	-37.3'	129.1°	41°27.4'	-38.1'	129.8°	40°48.7'	-38.9'	130.5°	40°09.4'	-39.7'	131.1°	39°29.7'	-40.5'	131.8°	38°49.5'	-41.2'	132.4°	38°08.8'	-41.9'	133.0°	17
18	41°28.2'	-37.9'	130.2°	40°49.2'	-38.7'	130.9°	40°09.7'	-39.5'	131.5°	39°29.7'	-40.2'	132.1°	38°49.2'	-40.9'	132.7°	38°08.3'	-41.6'	133.3°	37°26.9'	-42.3'	133.9°	18
19	40°50.3'	-38.4'	131.2°	40°10.5'	-39.2'	131.9°	39°30.2'	-39.9'	132.5°	38°49.5'	-40.7'	133.1°	38°08.3'	-41.4'	133.7°	37°26.7'	-42.0'	134.2°	36°44.6'	-42.7'	134.8°	19
20	40°11.9'	-38.9'	132.2°	39°31.3'	-39.7'	132.9°	38°50.3'	-40.4'	133.4°	38°08.8'	-41.1'	134.0°	37°26.9'	-41.8'								

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

36° 324° LHA

Latitude CONTRARY to Declination

36° 324° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	51°43.1'	-24.0'	108.4°	51°23.6'	-25.4'	109.6°	51°02.9'	-26.8'	110.8°	50°41.1'	-28.2'	111.9°	50°18.1'	-29.5'	113.0°	49°54.1'	-30.8'	114.1°	49°29.1'	-32.0'	115.2°	0
1	51°49.1'	-25.1'	109.9°	50°58.2'	-26.5'	111.1°	50°36.1'	-27.8'	112.2°	50°12.9'	-29.2'	113.3°	49°48.6'	-30.4'	114.4°	49°23.3'	-31.7'	115.5°	48°57.0'	-32.9'	116.5°	1
2	50°54.0'	-26.1'	111.3°	50°31.7'	-27.5'	112.5°	50°08.2'	-28.8'	113.6°	49°43.7'	-30.1'	114.7°	49°18.2'	-31.3'	115.7°	48°51.6'	-32.5'	116.8°	48°24.2'	-33.7'	117.8°	2
3	50°28.0'	-27.1'	112.8°	50°04.2'	-28.5'	113.9°	49°39.4'	-29.7'	114.9°	49°13.6'	-31.0'	116.0°	48°46.8'	-32.2'	117.0°	48°19.1'	-33.4'	118.0°	47°50.5'	-34.5'	119.0°	3
4	50°00.8'	-28.1'	114.2°	49°35.8'	-29.4'	115.2°	49°09.7'	-30.7'	116.3°	48°42.6'	-31.9'	117.3°	48°14.7'	-33.0'	118.3°	47°45.8'	-34.1'	119.3°	47°16.0'	-35.2'	120.2°	4
5	49°32.7'	-29.1'	115.5°	49°06.3'	-30.3'	116.6°	48°39.0'	-31.5'	117.6°	48°10.8'	-32.7'	118.6°	47°41.6'	-33.8'	119.5°	47°11.6'	-34.9'	120.5°	46°40.8'	-35.9'	121.4°	5
6	49°03.6'	-30.0'	116.9°	48°36.0'	-31.2'	117.9°	48°07.5'	-32.4'	118.9°	47°38.1'	-33.5'	119.8°	47°07.8'	-34.6'	120.8°	46°36.7'	-35.6'	121.7°	46°04.8'	-36.6'	122.6°	6
7	48°33.6'	-30.9'	118.2°	48°04.8'	-32.0'	119.2°	47°35.2'	-33.2'	120.1°	47°04.6'	-34.3'	121.1°	46°33.3'	-35.3'	122.0°	46°01.1'	-36.3'	122.8°	45°28.2'	-37.3'	123.7°	7
8	48°02.7'	-31.7'	119.5°	47°32.8'	-32.8'	120.4°	47°02.0'	-33.9'	121.4°	46°30.4'	-35.0'	122.3°	45°58.0'	-36.0'	123.1°	45°24.8'	-37.0'	124.0°	44°50.9'	-37.9'	124.8°	8
9	47°31.0'	-32.5'	120.7°	46°59.9'	-33.6'	121.7°	46°28.0'	-34.7'	122.6°	45°55.4'	-35.7'	123.4°	45°21.9'	-36.7'	124.3°	44°47.8'	-37.6'	125.1°	44°13.0'	-38.5'	125.9°	9
10	46°58.5'	-33.3'	122.0°	46°26.3'	-34.4'	122.9°	45°53.4'	-35.4'	123.7°	45°19.7'	-36.4'	124.6°	44°45.3'	-37.3'	125.4°	44°10.2'	-38.2'	126.2°	43°34.4'	-39.1'	127.0°	10
11	46°25.1'	-34.1'	123.2°	45°51.9'	-35.1'	124.0°	45°18.0'	-36.1'	124.9°	44°43.3'	-37.0'	125.7°	44°08.0'	-37.9'	126.5°	43°31.9'	-38.8'	127.3°	42°55.3'	-39.7'	128.0°	11
12	45°51.1'	-34.8'	124.4°	45°16.8'	-35.8'	125.2°	44°41.9'	-36.7'	126.0°	44°06.3'	-37.6'	126.8°	43°30.0'	-38.5'	127.6°	42°53.1'	-39.4'	128.3°	42°15.6'	-40.2'	129.0°	12
13	45°16.3'	-35.5'	125.5°	44°41.1'	-36.4'	126.3°	44°05.2'	-37.4'	127.1°	43°28.6'	-38.2'	127.9°	42°51.5'	-39.1'	128.6°	42°13.8'	-39.9'	129.3°	41°35.4'	-40.7'	130.0°	13
14	44°40.8'	-36.2'	126.7°	44°04.6'	-37.1'	127.5°	43°27.8'	-38.0'	128.2°	42°50.4'	-38.8'	128.9°	42°12.4'	-39.6'	129.7°	41°33.8'	-40.4'	130.3°	40°54.7'	-41.2'	131.0°	14
15	44°04.6'	-36.8'	127.8°	43°27.5'	-37.7'	128.5°	42°49.9'	-38.5'	129.3°	42°11.6'	-39.4'	130.0°	41°32.8'	-40.1'	130.7°	40°53.4'	-40.9'	131.3°	40°13.5'	-41.7'	132.0°	15
16	43°27.8'	-37.4'	128.9°	42°49.9'	-38.3'	129.6°	42°11.3'	-39.1'	130.3°	41°32.2'	-39.6'	131.3°	40°52.4'	-40.4'	132.0°	40°12.0'	-41.1'	132.6°	39°31.1'	-41.8'	133.2°	16
17	42°50.4'	-38.0'	130.0°	42°11.6'	-38.8'	130.7°	41°32.2'	-39.6'	131.3°	40°52.6'	-40.1'	132.3°	40°12.0'	-40.9'	133.0°	39°30.9'	-41.6'	133.6°	38°49.3'	-42.3'	134.2°	17
18	42°12.4'	-38.6'	131.0°	41°32.8'	-39.4'	131.7°	40°52.6'	-40.1'	132.3°	40°12.0'	-40.9'	133.0°	39°30.9'	-41.6'	133.6°	38°49.3'	-42.3'	134.2°	38°07.3'	-42.9'	134.7°	18
19	41°33.8'	-39.1'	132.0°	40°53.4'	-39.9'	132.7°	40°12.5'	-40.6'	133.3°	39°31.1'	-41.3'	133.9°	38°49.3'	-42.0'	134.5°	38°07.0'	-42.7'	135.1°	37°24.4'	-43.3'	135.6°	19
20	40°54.7'	-39.6'	133.0°	40°13.5'	-40.4'	133.7°	39°31.9'	-41.1'	134.3°	38°49.8'	-41.8'	134.8°	38°07.3'	-42.4'	135.4°	37°24.4'	-43.1'	135.9°	36°41.0'	-43.7'	136.5°	20
21	40°15.1'	-40.1'	134.0°	39°33.2'	-40.8'	134.6°	38°50.8'	-41.5'	135.2°	38°08.0'	-42.2'	135.8°	37°24.9'	-42.8'	136.3°	36°41.3'	-43.4'	136.8°	35°57.9'	-44.0'	137.3°	21
22	39°35.0'	-40.6'	135.0°	38°52.4'	-41.3'	135.6°	38°09.3'	-41.9'	136.1°	37°25.9'	-42.6'	136.7°	36°42.0'	-43.2'	137.2°	35°57.9'	-43.8'	137.7°	35°13.3'	-44.4'	138.2°	22
23	38°54.4'	-41.0'	135.9°	38°11.1'	-41.7'	136.5°	37°27.4'	-42.3'	137.0°	36°43.3'	-43.0'	137.5°	35°58.8'	-43.6'	138.0°	35°14.1'	-44.1'	138.5°	34°29.0'	-44.7'	139.0°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

36° 324° LHA

Latitude CONTRARY to DECLINATION

36° 324° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

35° 325° LHA

Latitude CONTRARY to Declination

35° 325° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	52°38.2'	-24.5'	109.1°	52°18.1'	-25.9'	110.3°	51°56.7'	-27.4'	111.5°	51°34.1'	-28.7'	112.7°	51°10.5'	-30.1'	113.8°	50°45.7'	-31.3'	114.9°	50°19.9'	-32.6'	116.0°	0
1	52°13.8'	-25.6'	110.6°	51°52.1'	-27.0'	111.8°	51°29.3'	-28.4'	112.9°	51°05.4'	-29.7'	114.1°	50°40.4'	-31.0'	115.2°	50°14.4'	-32.3'	116.3°	49°47.3'	-33.5'	117.3°	1
2	51°48.1'	-26.7'	112.0°	51°25.1'	-28.1'	113.2°	51°01.0'	-29.4'	114.3°	50°35.7'	-30.7'	115.4°	50°09.4'	-31.9'	116.5°	49°42.1'	-33.1'	117.6°	49°13.8'	-34.3'	118.6°	2
3	51°21.5'	-27.7'	113.5°	50°57.1'	-29.1'	114.6°	50°31.6'	-30.3'	115.7°	50°05.0'	-31.6'	116.8°	49°37.5'	-32.8'	117.8°	49°09.0'	-34.0'	118.9°	48°39.6'	-35.1'	119.9°	3
4	50°53.8'	-28.7'	114.9°	50°28.0'	-30.0'	116.0°	50°01.2'	-31.3'	117.1°	49°33.4'	-32.5'	118.1°	49°04.7'	-33.6'	119.1°	48°35.0'	-34.8'	120.1°	48°04.5'	-35.8'	121.1°	4
5	50°25.1'	-29.7'	116.3°	49°58.0'	-30.9'	117.3°	49°30.0'	-32.1'	118.4°	49°01.0'	-33.3'	119.4°	48°31.1'	-34.4'	120.4°	48°00.3'	-35.5'	121.3°	47°28.7'	-36.6'	122.3°	5
6	49°55.4'	-30.7'	117.6°	49°27.1'	-31.8'	118.7°	48°57.8'	-33.0'	119.7°	48°27.7'	-34.1'	120.7°	47°56.6'	-35.2'	121.6°	47°24.8'	-36.2'	122.5°	46°52.1'	-37.3'	123.5°	6
7	49°24.7'	-31.5'	119.0°	48°55.2'	-32.7'	120.0°	48°24.8'	-33.8'	120.9°	47°53.6'	-34.9'	121.9°	47°21.4'	-35.9'	122.8°	46°48.5'	-36.9'	123.7°	46°14.8'	-37.9'	124.6°	7
8	48°53.2'	-32.4'	120.3°	48°22.6'	-33.5'	121.2°	47°51.0'	-34.6'	122.2°	47°18.7'	-35.6'	123.1°	46°45.5'	-36.6'	124.0°	46°11.6'	-37.6'	124.9°	45°36.9'	-38.6'	125.7°	8
9	48°20.8'	-33.2'	121.5°	47°49.1'	-34.3'	122.5°	47°16.4'	-35.3'	123.4°	46°43.0'	-36.3'	124.3°	46°08.9'	-37.3'	125.1°	45°34.0'	-38.3'	126.0°	44°58.4'	-39.2'	126.8°	9
10	47°47.6'	-34.0'	122.8°	47°14.8'	-35.0'	123.7°	46°41.1'	-36.1'	124.6°	46°06.7'	-37.0'	125.4°	45°31.5'	-38.0'	126.3°	44°55.7'	-38.9'	127.1°	44°19.2'	-39.7'	127.9°	10
11	47°13.6'	-34.8'	124.0°	46°39.7'	-35.8'	124.9°	46°05.0'	-36.7'	125.7°	45°29.7'	-37.7'	126.6°	44°53.6'	-38.6'	127.4°	44°16.8'	-39.5'	128.1°	43°39.5'	-40.3'	128.9°	11
12	46°38.9'	-35.5'	125.2°	46°04.0'	-36.5'	126.0°	45°28.3'	-37.4'	126.9°	44°52.0'	-38.3'	127.7°	44°15.0'	-39.2'	128.4°	43°37.4'	-40.0'	129.2°	42°59.2'	-40.8'	129.9°	12
13	46°03.4'	-36.2'	126.4°	45°27.5'	-37.1'	127.2°	44°50.9'	-38.0'	128.0°	44°13.7'	-38.9'	128.7°	43°35.8'	-39.7'	129.5°	42°57.4'	-40.6'	130.2°	42°18.3'	-41.3'	130.9°	13
14	45°27.2'	-36.9'	127.5°	44°50.4'	-37.8'	128.3°	44°12.9'	-38.6'	129.1°	43°34.8'	-39.5'	129.8°	42°56.1'	-40.3'	130.5°	42°16.8'	-41.1'	131.2°	41°37.0'	-41.8'	131.9°	14
15	44°50.4'	-37.5'	128.6°	44°12.6'	-38.4'	129.4°	43°34.2'	-39.2'	130.1°	42°55.3'	-40.0'	130.8°	42°15.8'	-40.8'	131.5°	41°35.7'	-41.6'	132.2°	40°55.2'	-42.3'	132.8°	15
16	44°12.9'	-38.1'	129.7°	43°34.2'	-39.0'	130.4°	42°55.0'	-39.8'	131.2°	42°15.3'	-40.5'	131.8°	41°35.0'	-41.3'	132.5°	40°54.2'	-42.0'	133.2°	40°12.9'	-42.7'	133.8°	16
17	43°34.8'	-38.7'	130.8°	42°55.3'	-39.5'	131.5°	42°15.3'	-40.3'	132.2°	41°34.7'	-41.0'	132.8°	40°53.7'	-41.8'	133.5°	40°12.2'	-42.5'	134.1°	39°30.2'	-43.1'	134.7°	17
18	42°56.1'	-39.3'	131.8°	42°15.8'	-40.0'	132.5°	41°35.0'	-40.8'	133.2°	40°53.7'	-41.5'	133.8°	40°11.9'	-42.2'	134.4°	39°29.7'	-42.9'	135.0°	38°47.0'	-43.5'	135.6°	18
19	42°16.8'	-39.8'	132.9°	41°35.7'	-40.6'	133.5°	40°54.2'	-41.3'	134.1°	40°12.2'	-42.0'	134.8°	39°29.7'	-42.7'	135.3°	38°46.8'	-43.3'	135.9°	38°03.5'	-43.9'	136.5°	19
20	41°37.0'	-40.3'	133.9°	40°55.2'	-41.0'	134.5°	40°12.9'	-41.7'	135.1°	39°30.2'	-42.4'	135.7°	38°47.0'	-43.1'	136.3°							

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

34° 326° LHA

Latitude CONTRARY to Declination

34° 326° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	53°33.2'	-25.0'	109.7°	53°12.3'	-26.5'	111.0°	52°50.2'	-27.9'	112.2°	52°26.9'	-29.3'	113.4°	52°02.5'	-30.6'	114.6°	51°37.0'	-31.9'	115.8°	51°10.4'	-33.2'	116.9°	0
1	53°08.1'	-26.2'	111.3°	52°45.8'	-27.6'	112.5°	52°22.3'	-29.0'	113.7°	51°57.6'	-30.3'	114.9°	51°31.9'	-31.6'	116.0°	51°05.0'	-32.9'	117.1°	50°37.2'	-34.1'	118.2°	1
2	52°42.0'	-27.3'	112.7°	52°18.3'	-28.6'	113.9°	51°53.3'	-30.0'	115.1°	51°27.3'	-31.3'	116.3°	51°00.3'	-32.5'	117.4°	50°32.2'	-33.7'	118.4°	50°03.1'	-34.9'	119.5°	2
3	52°14.8'	-28.3'	114.2°	51°49.6'	-29.7'	115.4°	51°23.4'	-31.0'	116.5°	50°56.1'	-32.2'	117.6°	50°27.8'	-33.4'	118.7°	49°58.5'	-34.6'	119.7°	49°28.2'	-35.7'	120.8°	3
4	51°46.4'	-29.3'	115.6°	51°19.9'	-30.6'	116.8°	50°52.4'	-31.9'	117.9°	50°23.9'	-33.1'	118.9°	49°54.3'	-34.3'	120.0°	49°23.9'	-35.4'	121.0°	48°52.5'	-36.5'	122.0°	4
5	51°17.1'	-30.3'	117.0°	50°49.3'	-31.6'	118.1°	50°20.5'	-32.8'	119.2°	49°50.8'	-34.0'	120.2°	49°20.1'	-35.1'	121.3°	48°48.5'	-36.2'	122.2°	48°16.1'	-37.2'	123.2°	5
6	50°46.8'	-31.3'	118.4°	50°17.7'	-32.5'	119.5°	49°47.7'	-33.6'	120.5°	49°16.8'	-34.8'	121.5°	48°45.0'	-35.8'	122.5°	48°12.4'	-36.9'	123.4°	47°38.9'	-37.9'	124.4°	6
7	50°15.5'	-32.2'	119.8°	49°45.2'	-33.3'	120.8°	49°14.1'	-34.5'	121.8°	48°42.0'	-35.6'	122.8°	48°09.2'	-36.6'	123.7°	47°35.5'	-37.6'	124.6°	47°01.0'	-38.6'	125.5°	7
8	49°43.3'	-33.1'	121.1°	49°11.9'	-34.2'	122.1°	48°39.6'	-35.3'	123.0°	48°06.5'	-36.3'	124.0°	47°32.6'	-37.3'	124.9°	46°57.9'	-38.3'	125.8°	46°22.4'	-39.2'	126.6°	8
9	49°10.3'	-33.9'	122.4°	48°37.7'	-35.0'	123.3°	48°04.4'	-36.0'	124.3°	47°30.2'	-37.0'	125.2°	46°55.3'	-38.0'	126.0°	46°19.6'	-38.9'	126.9°	45°43.2'	-39.8'	127.7°	9
10	48°36.4'	-34.7'	123.6°	48°02.7'	-35.7'	124.5°	47°28.3'	-36.7'	125.4°	46°53.2'	-37.7'	126.3°	46°17.3'	-38.6'	127.2°	45°40.7'	-39.5'	128.0°	45°03.4'	-40.4'	128.8°	10
11	48°01.7'	-35.5'	124.8°	47°27.0'	-36.5'	125.7°	46°51.6'	-37.4'	126.6°	46°15.5'	-38.4'	127.4°	45°38.7'	-39.3'	128.3°	45°01.2'	-40.1'	129.1°	44°23.1'	-40.9'	129.8°	11
12	47°26.2'	-36.2'	126.0°	46°50.6'	-37.2'	126.9°	46°14.2'	-38.1'	127.7°	45°37.1'	-39.0'	128.6°	44°59.4'	-39.8'	129.3°	44°21.1'	-40.7'	130.1°	43°42.1'	-41.5'	130.8°	12
13	46°50.0'	-36.9'	127.2°	46°13.4'	-37.8'	128.0°	45°36.1'	-38.7'	128.9°	44°58.1'	-39.6'	129.6°	44°19.6'	-40.4'	130.4°	43°40.4'	-41.2'	131.1°	43°00.6'	-42.0'	131.8°	13
14	46°13.1'	-37.6'	128.4°	45°35.6'	-38.5'	129.2°	44°57.4'	-39.3'	129.9°	44°18.6'	-40.1'	130.7°	43°39.2'	-40.9'	131.4°	42°59.2'	-41.7'	132.1°	42°18.7'	-42.5'	132.8°	14
15	45°35.6'	-38.2'	129.5°	44°57.1'	-39.1'	130.2°	44°18.1'	-39.9'	131.0°	43°38.4'	-40.7'	131.7°	42°58.2'	-41.5'	132.4°	42°17.5'	-42.2'	133.1°	41°36.2'	-42.9'	133.8°	15
16	44°57.4'	-38.8'	130.6°	44°18.1'	-39.6'	131.3°	43°38.2'	-40.4'	132.0°	42°57.7'	-41.2'	132.7°	42°16.7'	-42.0'	133.4°	41°35.3'	-42.7'	134.1°	40°53.3'	-43.4'	134.7°	16
17	44°18.6'	-39.4'	131.6°	43°38.4'	-40.2'	132.4°	42°57.7'	-41.0'	133.1°	42°16.5'	-41.7'	133.7°	41°34.8'	-42.2'	134.7°	40°52.4'	-42.9'	135.3°	40°10.0'	-43.8'	135.6°	17
18	43°39.2'	-40.0'	132.7°	42°58.2'	-40.7'	133.4°	42°16.7'	-41.5'	134.0°	41°34.8'	-42.2'	134.7°	40°52.4'	-42.9'	135.3°	40°09.5'	-43.5'	135.9°	39°26.2'	-44.2'	136.5°	18
19	42°59.2'	-40.5'	133.7°	42°17.5'	-41.2'	134.4°	41°35.3'	-42.0'	135.0°	40°52.6'	-42.6'	135.6°	40°09.5'	-43.3'	136.2°	39°26.0'	-43.9'	136.8°	38°42.0'	-44.5'	137.4°	19
20	42°18.7'	-41.0'	134.7°	41°36.2'	-41.7'	135.4°	40°53.3'	-42.4'	136.0°	40°10.0'	-43.1'	136.6°	39°26.2'	-43.7'	137.1°	38°42.0'	-44.3'	137.7°	37°57.5'	-44.9'	138.2°	20
21	41°37.7'	-41.5'	135.7°	40°54.5'	-42.2'	136.3°	40°10.9'	-42.9'	136.9°	39°26.9'	-43.5'	137.5°	38°42.5'	-44.1'	138.0°	37°57.7'	-44.7'	138.5°	37°12.6'	-45.3'	139.0°	21
22	40°56.1'	-42.0'	136.7°	40°12.3'	-42.6'	137.2°	39°28.0'	-43.3'	137.8°	38°43.4'	-43.9'	138.4°	37°58.4'	-44.5'	138.9°	37°13.0'	-45.0'	139.4°	36°27.3'	-45.6'	139.9°	22
23	40°14.2'	-42.4'	137.6°	39°29.7'	-43.1'	138.2°	38°44.8'	-43.7'	138.7°	37°59.5'	-44.3'	139.2°	37°13.9'	-44.8'	139.7°	36°28.0'	-45.4'	140.2°	35°41.7'	-45.9'	140.7°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

34° 326° LHA

Latitude CONTRARY to DECLINATION

34° 326° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

33° 327° LHA

Latitude CONTRARY to Declination

33° 327° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	54°27.8'	-25.6'	110.4°	54°06.3'	-27.1'	111.7°	53°43.5'	-28.5'	113.0°	53°19.4'	-29.9'	114.2°	52°54.2'	-31.2'	115.4°	52°27.9'	-32.5'	116.6°	52°00.5'	-33.8'	117.8°	0
1	54°02.3'	-26.7'	112.0°	53°39.2'	-28.2'	113.2°	53°15.0'	-29.6'	114.5°	52°49.5'	-30.9'	115.7°	52°23.0'	-32.2'	116.9°	51°55.3'	-33.5'	118.0°	51°26.7'	-34.7'	119.1°	1
2	53°35.5'	-27.9'	113.5°	53°11.1'	-29.3'	114.7°	52°45.4'	-30.6'	115.9°	52°18.6'	-31.9'	117.1°	51°50.8'	-33.2'	118.2°	51°21.9'	-34.4'	119.3°	50°52.0'	-35.5'	120.4°	2
3	53°07.7'	-29.0'	115.0°	52°41.8'	-30.3'	116.2°	52°14.8'	-31.6'	117.3°	51°46.7'	-32.8'	118.5°	51°17.6'	-34.1'	119.6°	50°47.5'	-35.2'	120.6°	50°16.5'	-36.3'	121.7°	3
4	52°38.8'	-30.0'	116.4°	52°11.5'	-31.3'	117.6°	51°43.2'	-32.5'	118.7°	51°13.9'	-33.8'	119.8°	50°43.5'	-34.9'	120.9°	50°12.3'	-36.0'	121.9°	49°40.1'	-37.1'	122.9°	4
5	52°08.8'	-31.0'	117.9°	51°40.2'	-32.2'	119.0°	51°10.6'	-33.5'	120.1°	50°40.2'	-34.6'	121.1°	50°08.6'	-35.7'	122.2°	49°36.3'	-36.8'	123.2°	49°03.0'	-37.8'	124.1°	5
6	51°37.8'	-32.0'	119.2°	51°08.0'	-33.2'	120.3°	50°37.2'	-34.3'	121.4°	50°05.5'	-35.4'	122.4°	49°32.9'	-36.5'	123.4°	48°59.4'	-37.6'	124.4°	48°25.2'	-38.5'	125.3°	6
7	51°05.8'	-32.9'	120.6°	50°34.8'	-34.0'	121.6°	50°02.9'	-35.2'	122.7°	49°30.0'	-36.2'	123.7°	48°56.4'	-37.3'	124.6°	48°21.9'	-38.3'	125.5°	47°46.6'	-39.2'	126.4°	7
8	50°32.9'	-33.7'	121.9°	50°00.8'	-34.9'	122.9°	49°27.7'	-35.9'	123.9°	48°53.8'	-37.0'	124.9°	48°19.1'	-38.0'	125.8°	47°43.6'	-38.9'	126.7°	47°07.4'	-39.9'	127.6°	8
9	49°59.2'	-34.6'	123.2°	49°25.9'	-35.7'	124.2°	48°51.8'	-36.7'	125.1°	48°16.8'	-37.7'	126.1°	47°41.1'	-38.7'	127.0°	47°04.7'	-39.6'	127.8°	46°27.6'	-40.5'	128.7°	9
10	49°24.6'	-35.4'	124.5°	48°50.2'	-36.4'	125.4°	48°15.1'	-37.4'	126.3°	47°39.1'	-38.4'	127.2°	47°02.5'	-39.3'	128.1°	46°25.1'	-40.2'	128.9°	45°47.1'	-41.0'	129.7°	10
11	48°49.2'	-36.2'	125.7°	48°13.8'	-37.2'	126.6°	47°37.6'	-38.1'	127.5°	47°00.7'	-39.0'	128.4°	46°23.2'	-39.9'	129.2°	45°44.9'	-40.8'	130.0°	45°06.1'	-41.6'	130.8°	11
12	48°13.0'	-36.9'	126.9°	47°36.6'	-37.9'	127.8°	46°59.5'	-38.8'	128.6°	46°21.7'	-39.7'	129.5°	45°43.2'	-40.5'	130.3°	45°04.2'	-41.3'	131.0°	44°24.5'	-42.1'	131.8°	12
13	47°36.1'	-37.6'	128.1°	46°58.8'	-38.5'	128.9°	46°20.7'	-39.4'	129.8°	45°42.0'	-40.3'	130.5°	45°02.7'	-41.1'	131.3°	44°22.8'	-41.9'	132.1°	43°42.3'	-42.6'	132.8°	13
14	46°58.5'	-38.3'	129.2°	46°20.2'	-39.2'	130.1°	45°41.3'	-40.0'	130.8°	45°01.8'	-40.8'	131.6°	44°21.6'	-41.6'	132.3°	43°41.0'	-42.4'	133.1°	42°59.7'	-43.1'	133.7°	14
15	46°20.2'	-38.9'	130.4°	45°41.1'	-39.8'	131.1°	45°01.3'	-40.6'	131.9°	44°20.9'	-41.4'	132.6°	43°40.0'	-42.1'	133.3°	42°58.6'	-42.9'	134.0°	42°16.6'	-43.6'	134.7°	15
16	45°41.3'	-39.5'	131.5°	45°01.3'	-40.4'	132.2°	44°20.7'	-41.1'	132.9°	43°39.6'	-41.9'	133.6°	42°57.9'	-42.6'	134.3°	42°15.7'	-43.3'	135.0°	41°33.1'	-44.0'	135.6°	16
17	45°01.8'	-40.1'	132.5°	44°20.9'	-40.9'	133.3°	43°39.6'	-41.7'	134.0°	42°57.7'	-42.4'	134.6°	42°15.3'	-43.1'	135.3°	41°32.4'	-43.8'	135.9°	40°49.1'	-44.4'	136.5°	17
18	44°21.6'	-40.7'	133.6°	43°40.0'	-41.4'	134.3°	42°57.9'	-42.2'	134.9°	42°15.3'	-42.9'	135.6°	41°32.2'	-43.5'	136.2°	40°48.6'	-44.2'	136.8°	40°04.7'	-44.8'	137.4°	18
19	43°41.0'	-41.2'	134.6°	42°58.6'	-41.9'	135.3°	42°15.7'	-42.6'	135.9°	41°32.4'	-43.3'	136.5°	40°48.6'	-44.0'	137.1°	39°19.9'	-45.0'	137.7°	39°19.9'	-45.2'	138.3°	19
20	42°59.7'	-41.7'	135.6°	42°16.6'	-42.4'	136.2°	41°33.1'	-43.1'	136.9°	40°49.1'	-43.7'	137.4°	40°04.7'	-44.4'	138.0°							

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

32° 328° LHA

Latitude CONTRARY to Declination

32° 328° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	55°22.3'	-26.2'	111.2°	54°60.0'	-27.7'	112.5°	54°36.4'	-29.1'	113.8°	54°11.6'	-30.5'	115.1°	53°45.6'	-31.9'	116.3°	53°18.4'	-33.2'	117.5°	52°50.1'	-34.4'	118.7°	0
1	54°56.1'	-27.4'	112.7°	54°32.3'	-28.8'	114.0°	54°07.3'	-30.2'	115.3°	53°41.1'	-31.6'	116.5°	53°13.7'	-32.9'	117.7°	52°45.2'	-34.1'	118.9°	52°15.7'	-35.3'	120.0°	1
2	54°28.8'	-28.5'	114.3°	54°03.5'	-29.9'	115.5°	53°37.1'	-31.3'	116.8°	53°09.5'	-32.6'	118.0°	52°40.8'	-33.8'	119.1°	52°11.1'	-35.0'	120.3°	51°40.4'	-36.2'	121.4°	2
3	54°00.3'	-29.6'	115.8°	53°33.6'	-31.0'	117.0°	53°05.8'	-32.3'	118.2°	52°36.9'	-33.5'	119.4°	52°07.0'	-34.7'	120.5°	51°36.1'	-35.9'	121.6°	51°04.2'	-37.0'	122.6°	3
4	53°30.7'	-30.7'	117.3°	53°02.7'	-32.0'	118.4°	52°33.6'	-33.2'	119.6°	52°03.4'	-34.4'	120.7°	51°32.3'	-35.6'	121.8°	51°00.2'	-36.7'	122.9°	50°27.2'	-37.8'	123.9°	4
5	53°00.0'	-31.7'	118.7°	52°30.7'	-32.9'	119.8°	52°00.3'	-34.1'	121.0°	51°29.0'	-35.3'	122.0°	50°56.7'	-36.4'	123.1°	50°23.5'	-37.5'	124.1°	49°49.4'	-38.5'	125.1°	5
6	52°28.4'	-32.6'	120.1°	51°57.8'	-33.9'	121.2°	51°26.2'	-35.0'	122.3°	50°53.7'	-36.1'	123.3°	50°20.3'	-37.2'	124.3°	49°46.0'	-38.2'	125.3°	49°10.9'	-39.2'	126.3°	6
7	51°55.7'	-33.6'	121.5°	51°23.9'	-34.7'	122.5°	50°51.2'	-35.9'	123.6°	50°17.6'	-36.9'	124.6°	49°43.1'	-38.0'	125.6°	49°07.8'	-38.9'	126.5°	48°31.7'	-39.9'	127.4°	7
8	51°22.1'	-34.5'	122.8°	50°49.2'	-35.6'	123.8°	50°15.3'	-36.7'	124.8°	49°40.6'	-37.7'	125.8°	49°05.1'	-38.7'	126.8°	48°28.8'	-39.6'	127.7°	47°51.8'	-40.5'	128.5°	8
9	50°47.7'	-35.3'	124.1°	50°13.6'	-36.4'	125.1°	49°38.7'	-37.4'	126.1°	49°02.9'	-38.4'	127.0°	48°26.4'	-39.4'	127.9°	47°49.2'	-40.3'	128.8°	47°11.3'	-41.1'	129.6°	9
10	50°12.3'	-36.1'	125.4°	49°37.2'	-37.2'	126.3°	49°01.2'	-38.1'	127.3°	48°24.5'	-39.1'	128.2°	47°47.1'	-40.0'	129.0°	47°09.0'	-40.9'	129.9°	46°30.2'	-41.7'	130.7°	10
11	49°36.2'	-36.9'	126.6°	49°00.0'	-37.9'	127.5°	48°23.1'	-38.8'	128.4°	47°45.4'	-39.7'	129.3°	47°07.1'	-40.6'	130.1°	46°28.1'	-41.5'	131.0°	45°48.5'	-42.3'	131.7°	11
12	48°59.3'	-37.6'	127.8°	48°22.1'	-38.6'	128.7°	47°44.3'	-39.5'	129.6°	47°05.7'	-40.4'	130.4°	46°26.5'	-41.2'	131.2°	45°46.6'	-42.0'	132.0°	45°06.2'	-42.8'	132.7°	12
13	48°21.7'	-38.3'	129.0°	47°43.6'	-39.3'	129.9°	47°04.8'	-40.1'	130.7°	46°25.3'	-41.0'	131.5°	45°45.3'	-41.8'	132.3°	45°04.6'	-42.5'	133.0°	44°23.4'	-43.3'	133.7°	13
14	47°43.3'	-39.0'	130.2°	47°04.3'	-39.9'	131.0°	46°24.6'	-40.7'	131.8°	45°44.4'	-41.5'	132.5°	45°03.5'	-42.3'	133.3°	44°22.1'	-43.0'	134.0°	43°40.1'	-43.8'	134.7°	14
15	47°04.3'	-39.7'	131.3°	46°24.4'	-40.5'	132.1°	45°43.9'	-41.3'	132.8°	45°02.8'	-42.1'	133.6°	44°21.2'	-42.8'	134.3°	43°39.0'	-43.5'	135.0°	42°56.4'	-44.2'	135.6°	15
16	46°24.6'	-40.3'	132.4°	45°43.9'	-41.1'	133.1°	45°02.6'	-41.8'	133.9°	44°20.7'	-42.6'	134.6°	43°38.4'	-43.3'	135.3°	42°55.5'	-44.0'	135.9°	42°12.2'	-44.6'	136.6°	16
17	45°44.4'	-40.9'	133.4°	45°02.8'	-41.6'	134.2°	44°20.7'	-42.4'	134.9°	43°38.2'	-43.1'	135.6°	42°55.1'	-43.8'	136.2°	42°11.5'	-44.4'	136.8°	41°27.6'	-45.0'	137.5°	17
18	45°03.5'	-41.4'	134.5°	44°21.2'	-42.2'	135.2°	43°38.4'	-42.9'	135.9°	42°55.1'	-43.5'	136.5°	42°11.3'	-44.2'	137.1°	41°27.1'	-44.8'	137.7°	40°42.5'	-45.4'	138.3°	18
19	44°22.1'	-41.9'	135.5°	43°39.0'	-42.7'	136.2°	42°55.5'	-43.3'	136.8°	42°11.5'	-44.0'	137.4°	41°27.1'	-44.6'	138.0°	40°42.3'	-45.2'	138.6°	39°57.1'	-45.8'	139.2°	19
20	43°40.1'	-42.4'	136.5°	42°56.4'	-43.1'	137.1°	42°12.2'	-43.8'	137.8°	41°27.6'	-44.4'	138.4°	40°42.5'	-45.0'	138.9°	39°57.1'	-45.6'	139.5°	39°11.3'	-46.2'	140.0°	20
21	42°57.7'	-42.9'	137.5°	42°13.3'	-43.6'	138.1°	41°28.4'	-44.2'	138.7°	40°43.1'	-44.8'	139.3°	39°57.5'	-45.4'	139.8°	38°11.5'	-46.0'	140.3°	38°25.1'	-46.5'	140.8°	21
22	42°14.8'	-43.4'	138.4°	41°29.7'	-44.0'	139.0°	40°44.2'	-44.6'	139.6°	39°58.3'	-45.2'	140.1°	39°12.1'	-45.8'	140.7°	38°25.5'	-46.3'	141.2°	37°38.6'	-46.8'	141.6°	22
23	41°31.4'	-43.8'	139.3°	40°45.7'	-44.4'	139.9°	39°59.6'	-45.0'	140.5°	39°13.1'	-45.6'	141.0°	38°26.3'	-46.1'	141.5°	37°39.2'	-46.6'	142.0°	36°51.8'	-47.1'	142.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

32° 328° LHA

Latitude CONTRARY to DECLINATION

32° 328° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

31° 329° LHA

Latitude CONTRARY to Declination

31° 329° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	56°16.4'	-26.8'	111.9°	55°53.4'	-28.3'	113.3°	55°29.0'	-29.8'	114.6°	55°03.4'	-31.2'	115.9°	54°36.5'	-32.5'	117.2°	54°08.5'	-33.8'	118.5°	53°39.4'	-35.1'	119.6°	0
1	55°49.6'	-28.0'	113.5°	55°25.1'	-29.5'	114.9°	54°59.2'	-30.9'	116.2°	54°32.2'	-32.2'	117.4°	54°04.0'	-33.5'	118.7°	53°34.7'	-34.8'	119.9°	53°04.3'	-36.0'	121.0°	1
2	55°21.6'	-29.2'	115.1°	54°55.6'	-30.6'	116.4°	54°28.4'	-31.9'	117.7°	53°56.0'	-33.2'	118.9°	53°30.4'	-34.5'	120.1°	52°59.9'	-35.7'	121.2°	52°28.3'	-36.9'	122.3°	2
3	54°52.5'	-30.3'	116.6°	54°25.1'	-31.6'	117.9°	53°56.4'	-33.0'	119.1°	53°26.7'	-34.2'	120.3°	52°55.9'	-35.4'	121.4°	52°24.2'	-36.6'	122.5°	51°51.4'	-37.7'	123.6°	3
4	54°22.2'	-31.4'	118.1°	53°53.4'	-32.7'	119.3°	53°23.5'	-33.9'	120.5°	52°52.5'	-35.1'	121.7°	52°20.5'	-36.3'	122.8°	51°47.6'	-37.4'	123.8°	51°13.7'	-38.5'	124.9°	4
5	53°50.9'	-32.4'	119.6°	53°20.7'	-33.6'	120.7°	52°49.6'	-34.9'	121.9°	52°17.4'	-36.0'	123.0°	51°44.2'	-37.1'	124.1°	51°10.2'	-38.2'	125.1°	50°35.3'	-39.2'	126.1°	5
6	53°18.5'	-33.4'	121.0°	52°47.1'	-34.6'	122.1°	52°14.7'	-35.7'	123.2°	51°41.4'	-36.8'	124.3°	51°07.1'	-37.9'	125.3°	50°32.0'	-38.9'	126.3°	49°56.1'	-39.9'	127.3°	6
7	52°45.1'	-34.3'	122.4°	52°12.5'	-35.5'	123.5°	51°39.0'	-36.6'	124.5°	51°04.5'	-37.6'	125.5°	50°29.2'	-38.7'	126.5°	49°53.1'	-39.6'	127.5°	49°16.2'	-40.6'	128.4°	7
8	52°10.8'	-35.2'	123.7°	51°37.0'	-36.3'	124.8°	51°02.4'	-37.4'	125.8°	50°26.9'	-38.4'	126.8°	49°50.5'	-39.4'	127.7°	49°13.4'	-40.3'	128.7°	48°35.6'	-41.2'	129.5°	8
9	51°35.6'	-36.1'	125.0°	51°00.7'	-37.1'	126.0°	50°25.0'	-38.1'	127.0°	49°48.5'	-39.1'	128.0°	49°11.2'	-40.1'	128.9°	48°33.1'	-41.0'	129.8°	47°54.4'	-41.8'	130.6°	9
10	50°59.5'	-36.9'	126.3°	50°23.6'	-37.9'	127.3°	49°46.9'	-38.9'	128.2°	49°09.3'	-39.8'	129.1°	48°31.1'	-40.7'	130.0°	47°52.2'	-41.6'	130.9°	47°12.6'	-42.4'	131.7°	10
11	50°22.7'	-37.7'	127.6°	49°45.7'	-38.6'	128.5°	49°08.0'	-39.6'	129.4°	48°29.5'	-40.5'	130.3°	47°50.4'	-41.3'	131.1°	47°10.6'	-42.1'	131.9°	46°30.2'	-42.9'	132.7°	11
12	49°45.0'	-38.4'	128.8°	49°07.1'	-39.3'	129.7°	48°28.4'	-40.2'	130.5°	47°49.1'	-41.1'	131.4°	47°09.1'	-41.9'	132.2°	46°28.5'	-42.7'	133.0°	45°47.3'	-43.5'	133.7°	12
13	49°06.6'	-39.1'	129.9°	48°27.7'	-40.0'	130.8°	47°48.2'	-40.9'	131.7°	47°08.0'	-41.7'	132.5°	46°27.2'	-42.5'	133.2°	45°45.8'	-43.2'	134.0°	45°03.8'	-43.9'	134.7°	13
14	48°27.5'	-39.8'	131.1°	47°47.7'	-40.6'	131.9°	47°07.3'	-41.5'	132.7°	46°26.3'	-42.2'	133.5°	45°44.7'	-43.0'	134.3°	45°02.6'	-43.7'	135.0°	44°19.9'	-44.4'	135.7°	14
15	47°47.7'	-40.4'	132.2°	47°07.1'	-41.2'	133.0°	46°25.9'	-42.0'	133.8°	45°44.1'	-42.8'	134.5°	45°01.7'	-43.5'	135.3°	44°18.8'	-44.2'	136.0°	43°35.5'	-44.9'	136.6°	15
16	47°07.3'	-41.0'	133.3°	46°25.9'	-41.8'	134.1°	45°43.8'	-42.6'	134.8°	45°01.3'	-43.3'	135.5°	44°18.2'	-44.0'	136.2°	43°34.6'	-44.6'	136.9°	42°50.6'	-45.3'	137.5°	16
17	46°26.3'	-41.6'	134.4°	45°44.1'	-42.4'	135.1°	45°01.3'	-43.1'	135.8°	44°18.0'	-43.8'	136.5°	43°34.2'	-44.4'	137.2°	42°50.0'	-45.1'	137.8°	42°05.3'	-45.7'	138.4°	17
18	45°44.7'	-42.2'	135.4°	45°01.7'	-42.9'	136.1°	44°18.2'	-43.6'	136.8°	43°34.2'	-44.2'	137.5°	42°49.8'	-44.9'	138.1°	42°04.9'	-45.5'	138.7°	41°19.6'	-46.1'	139.3°	18
19	45°02.6'	-42.7'	136.4°	44°18.8'	-43.4'	137.1°	43°34.6'	-44.0'	137.8°	42°50.0'	-44.7'	138.4°	42°04.9'	-45.3'	139.0°	41°19.4'	-45.9'	139.6°	40°33.6'	-46.4'	140.1°	19
20	44°19.9'	-43.2'	137.4°	43°35.5'	-43.8'	138.1°	42°50.6'	-44.5'	138.7°	42°05.3'	-45.1'	139.3°	41°19.6'	-45.7'								

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

30° 330° LHA

Latitude CONTRARY to Declination

30° 330° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	57°10.3'	-27.4'	112.7°	56°46.4'	-29.0'	114.1°	56°21.2'	-30.4'	115.5°	55°54.8'	-31.9'	116.9°	55°27.0'	-33.2'	118.2°	54°58.1'	-34.5'	119.4°	54°28.1'	-35.8'	120.6°	0
1	56°42.8'	-28.7'	114.4°	56°17.5'	-30.1'	115.7°	55°50.8'	-31.6'	117.1°	55°22.9'	-32.9'	118.4°	54°53.8'	-34.2'	119.6°	54°23.6'	-35.5'	120.8°	53°52.3'	-36.7'	122.0°	1
2	56°14.2'	-29.9'	116.0°	55°47.3'	-31.3'	117.3°	55°19.2'	-32.6'	118.6°	54°50.0'	-34.0'	119.8°	54°19.6'	-35.2'	121.0°	53°48.1'	-36.4'	122.2°	53°15.6'	-37.6'	123.3°	2
3	55°44.4'	-31.0'	117.5°	55°16.1'	-32.4'	118.8°	54°46.6'	-33.7'	120.0°	54°16.0'	-34.9'	121.2°	53°44.4'	-36.1'	122.4°	53°11.7'	-37.3'	123.5°	52°38.1'	-38.4'	124.6°	3
4	55°13.4'	-32.1'	119.0°	54°43.7'	-33.4'	120.3°	54°12.9'	-34.7'	121.5°	53°41.1'	-35.9'	122.6°	53°08.2'	-37.0'	123.8°	52°34.4'	-38.1'	124.8°	51°59.7'	-39.2'	125.9°	4
5	54°41.3'	-33.1'	120.5°	54°10.3'	-34.4'	121.7°	53°38.3'	-35.6'	122.8°	53°05.2'	-36.7'	124.0°	52°31.2'	-37.8'	125.1°	51°56.3'	-38.9'	126.1°	51°20.5'	-39.9'	127.1°	5
6	54°08.2'	-34.1'	121.9°	53°35.9'	-35.3'	123.1°	53°02.7'	-36.5'	124.2°	52°28.5'	-37.6'	125.3°	51°53.4'	-38.6'	126.3°	51°17.4'	-39.6'	127.3°	50°40.6'	-40.6'	128.3°	6
7	53°34.0'	-35.1'	123.3°	53°00.6'	-36.2'	124.4°	52°26.2'	-37.3'	125.5°	51°50.9'	-38.4'	126.5°	51°14.8'	-39.4'	127.6°	50°37.8'	-40.4'	128.5°	50°00.0'	-41.3'	129.5°	7
8	52°59.0'	-36.0'	124.7°	52°24.4'	-37.1'	125.7°	51°48.9'	-38.1'	126.8°	51°12.5'	-39.1'	127.8°	50°35.4'	-40.1'	128.7°	49°57.4'	-41.0'	129.7°	49°18.8'	-41.9'	130.6°	8
9	52°23.0'	-36.8'	126.0°	51°47.3'	-37.9'	127.0°	51°10.7'	-38.9'	128.0°	50°33.4'	-39.9'	129.0°	49°55.3'	-40.8'	129.9°	49°16.4'	-41.7'	130.8°	48°36.9'	-42.5'	131.7°	9
10	51°46.2'	-37.6'	127.3°	51°09.4'	-38.7'	128.3°	50°31.8'	-39.6'	129.2°	49°53.5'	-40.5'	130.2°	49°14.5'	-41.4'	131.0°	48°34.7'	-42.3'	131.9°	47°54.3'	-43.1'	132.7°	10
11	51°08.5'	-38.4'	128.5°	50°30.7'	-39.4'	129.5°	49°52.2'	-40.3'	130.4°	49°13.0'	-41.2'	131.3°	48°33.1'	-42.0'	132.1°	47°52.5'	-42.8'	133.0°	47°11.3'	-43.6'	133.8°	11
12	50°30.1'	-39.2'	129.7°	49°51.4'	-40.1'	130.7°	49°11.9'	-41.0'	131.5°	48°31.8'	-41.8'	132.4°	47°51.0'	-42.6'	133.2°	47°09.6'	-43.4'	134.0°	46°27.7'	-44.1'	134.8°	12
13	49°50.9'	-39.9'	130.9°	49°11.3'	-40.8'	131.8°	48°30.9'	-41.6'	132.7°	47°50.0'	-42.4'	133.5°	47°08.4'	-43.2'	134.3°	46°26.2'	-43.9'	135.0°	45°43.5'	-44.6'	135.7°	13
14	49°11.0'	-40.5'	132.1°	48°30.5'	-41.4'	132.9°	47°49.3'	-42.2'	133.7°	47°07.6'	-43.0'	134.5°	46°25.2'	-43.7'	135.3°	45°42.3'	-44.4'	136.0°	44°58.9'	-45.1'	136.7°	14
15	48°30.5'	-41.2'	133.2°	47°49.1'	-42.0'	134.0°	47°07.2'	-42.8'	134.8°	46°24.6'	-43.5'	135.5°	45°41.5'	-44.2'	136.3°	44°57.9'	-44.9'	137.0°	44°13.8'	-45.5'	137.6°	15
16	47°49.3'	-41.8'	134.3°	47°07.2'	-42.5'	135.1°	46°24.4'	-43.3'	135.8°	45°41.1'	-44.0'	136.5°	44°57.3'	-44.7'	137.2°	44°13.0'	-45.3'	137.9°	43°28.3'	-45.9'	138.5°	16
17	47°07.6'	-42.3'	135.4°	46°24.6'	-43.1'	136.1°	45°41.1'	-43.8'	136.8°	44°57.1'	-44.5'	137.5°	44°12.7'	-45.1'	138.2°	43°27.7'	-45.7'	138.8°	42°42.4'	-46.3'	139.4°	17
18	46°25.2'	-42.9'	136.4°	45°41.5'	-43.6'	137.1°	44°57.3'	-44.3'	137.8°	44°12.7'	-44.9'	138.4°	43°27.5'	-45.5'	139.1°	42°42.0'	-46.1'	139.7°	41°56.1'	-46.7'	140.3°	18
19	45°42.3'	-43.4'	137.4°	44°57.9'	-44.1'	138.1°	44°13.0'	-44.7'	138.7°	43°27.7'	-45.4'	139.4°	42°42.0'	-45.9'	140.0°	41°55.9'	-46.5'	140.5°	41°09.4'	-47.1'	141.1°	19
20	44°58.9'	-43.9'	138.4°	44°13.8'	-44.6'	139.0°	43°28.3'	-45.2'	139.7°	42°42.4'	-45.8'	140.3°	41°56.1'	-46.3'	140.8°	41°09.4'	-46.9'	141.4°	40°22.3'	-47.4'	141.9°	20
21	44°15.0'	-44.4'	139.3°	43°29.3'	-45.0'	140.0°	42°43.1'	-45.6'	140.6°	41°56.6'	-46.2'	141.1°	41°09.7'	-46.7'	141.7°	40°22.5'	-47.2'	142.2°	39°34.9'	-47.7'	142.7°	21
22	43°30.6'	-44.8'	140.3°	42°44.3'	-45.4'	140.9°	41°57.6'	-46.0'	141.4°	41°10.5'	-46.5'	142.0°	40°23.0'	-47.0'	142.5°	39°35.3'	-47.5'	143.0°	38°47.2'	-48.0'	143.5°	22
23	42°45.8'	-45.2'	141.2°	41°58.9'	-45.8'	141.7°	41°11.6'	-46.4'	142.3°	40°24.0'	-46.9'	142.8°	39°36.0'	-47.4'	143.3°	38°47.7'	-47.9'	143.8°	37°59.2'	-48.3'	144.3°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

30° 330° LHA

Latitude CONTRARY to DECLINATION

30° 330° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

29° 331° LHA

Latitude CONTRARY to Declination

29° 331° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	58°03.8'	-28.1'	113.6°	57°39.1'	-29.6'	115.0°	57°13.1'	-31.1'	116.4°	56°45.7'	-32.6'	117.8°	56°17.1'	-33.9'	119.1°	55°47.3'	-35.2'	120.4°	55°16.4'	-36.5'	121.7°	0
1	57°35.7'	-29.4'	115.2°	57°09.5'	-30.9'	116.6°	56°42.0'	-32.3'	118.0°	56°13.2'	-33.7'	119.3°	55°43.2'	-35.0'	120.6°	55°12.1'	-36.2'	121.9°	54°39.9'	-37.4'	123.1°	1
2	57°06.3'	-30.6'	116.9°	56°38.6'	-32.0'	118.2°	56°09.7'	-33.4'	119.5°	55°39.5'	-34.7'	120.8°	55°08.2'	-35.9'	122.0°	54°35.9'	-37.1'	123.2°	54°02.5'	-38.3'	124.4°	2
3	56°35.8'	-31.7'	118.4°	56°06.6'	-33.1'	119.7°	55°36.3'	-34.4'	121.0°	55°04.8'	-35.7'	122.2°	54°32.3'	-36.9'	123.4°	53°58.7'	-38.0'	124.6°	53°24.2'	-39.1'	125.7°	3
4	56°04.1'	-32.8'	120.0°	55°33.5'	-34.2'	121.2°	55°01.9'	-35.4'	122.5°	54°29.1'	-36.6'	123.6°	53°55.4'	-37.8'	124.8°	53°20.7'	-38.8'	125.9°	52°45.1'	-39.9'	127.0°	4
5	55°31.2'	-33.9'	121.4°	54°59.4'	-35.2'	122.7°	54°26.5'	-36.4'	123.9°	53°52.5'	-37.5'	125.0°	53°17.7'	-38.6'	126.1°	52°41.9'	-39.6'	127.2°	52°05.2'	-40.6'	128.2°	5
6	54°57.3'	-34.9'	122.9°	54°24.2'	-36.1'	124.1°	53°50.1'	-37.2'	125.2°	53°15.0'	-38.3'	126.3°	52°39.1'	-39.4'	127.4°	52°02.2'	-40.4'	128.4°	51°24.6'	-41.3'	129.4°	6
7	54°22.4'	-35.9'	124.3°	53°48.1'	-37.0'	125.4°	53°12.9'	-38.1'	126.5°	52°36.7'	-39.1'	127.6°	51°59.7'	-40.1'	128.6°	51°21.8'	-41.1'	129.6°	50°43.2'	-42.0'	130.5°	7
8	53°46.6'	-36.8'	125.7°	53°11.1'	-37.9'	126.8°	52°34.8'	-38.9'	127.8°	51°57.6'	-39.9'	128.8°	51°19.5'	-40.8'	129.8°	50°40.8'	-41.8'	130.7°	50°01.2'	-42.6'	131.7°	8
9	53°09.8'	-37.6'	127.0°	52°33.2'	-38.7'	128.0°	51°55.9'	-39.7'	129.1°	51°17.7'	-40.6'	130.0°	50°38.7'	-41.5'	131.0°	49°59.0'	-42.4'	131.9°	49°18.6'	-43.2'	132.7°	9
10	52°32.2'	-38.4'	128.3°	51°54.6'	-39.4'	129.3°	51°16.2'	-40.4'	130.3°	50°37.0'	-41.3'	131.2°	49°57.2'	-42.2'	132.1°	49°16.6'	-43.0'	133.0°	48°35.4'	-43.8'	133.8°	10
11	51°53.7'	-39.2'	129.5°	51°15.1'	-40.2'	130.5°	50°35.8'	-41.1'	131.4°	49°55.7'	-41.9'	132.3°	49°15.0'	-42.8'	133.2°	48°33.6'	-43.6'	134.0°	47°51.6'	-44.3'	134.8°	11
12	51°14.5'	-40.0'	130.8°	50°35.0'	-40.9'	131.7°	49°54.7'	-41.7'	132.6°	49°13.8'	-42.6'	133.4°	48°32.2'	-43.3'	134.3°	47°50.1'	-44.1'	135.1°	47°07.3'	-44.8'	135.8°	12
13	50°34.6'	-40.7'	131.9°	49°54.1'	-41.5'	132.8°	49°13.0'	-42.3'	133.7°	48°31.3'	-43.1'	134.5°	47°48.9'	-43.9'	135.3°	47°06.0'	-44.6'	136.1°	46°22.5'	-45.3'	136.8°	13
14	49°53.9'	-41.3'	133.1°	49°12.6'	-42.1'	133.9°	48°30.7'	-42.9'	134.8°	47°48.1'	-43.7'	135.5°	47°05.0'	-44.4'	136.3°	46°21.4'	-45.1'	137.0°	45°37.2'	-45.7'	137.7°	14
15	49°12.6'	-41.9'	134.2°	48°30.5'	-42.7'	135.0°	47°47.7'	-43.5'	135.8°	47°04.4'	-44.2'	136.6°	46°20.6'	-44.9'	137.3°	45°36.3'	-45.6'	138.0°	44°51.5'	-46.2'	138.7°	15
16	48°30.7'	-42.5'	135.3°	47°47.7'	-43.3'	136.1°	47°04.2'	-44.0'	136.8°	46°20.2'	-44.7'	137.5°	45°35.7'	-45.4'	138.2°	44°50.7'	-46.0'	138.9°	44°05.3'	-46.6'	139.5°	16
17	47°48.1'	-43.1'	136.4°	47°04.4'	-43.8'	137.1°	46°20.2'	-44.5'	137.8°	45°35.5'	-45.2'	138.5°	44°50.3'	-45.8'	139.2°	44°04.7'	-46.4'	139.8°	43°18.7'	-47.0'	140.4°	17
18	47°05.0'	-43.6'	137.4°	46°20.6'	-44.3'	138.1°	45°35.7'	-45.0'	138.8°	44°50.3'	-45.6'	139.4°	44°04.5'	-46.2'	140.1°	43°18.3'	-46.8'	140.7°	42°31.7'	-47.3'	141.3°	18
19	46°21.4'	-44.2'	138.4°	45°36.3'	-44.8'	139.1°	44°50.7'	-45.4'	139.7°	44°04.7'	-46.0'	140.4°	43°18.3'	-46.6'	141.0°	42°31.5'	-47.2'	141.5°	41°44.4'	-47.7'	142.1°	19
20	45°37.2'	-44.6'	139.4°	44°51.5'	-45.3'	140.0°	44°05.3'	-45.9'	140.6°	43°18.7'	-46.4'	141.2°	42°31.7'	-47.0'	141.8°							

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

28° 332° LHA

Latitude CONTRARY to Declination

28° 332° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	58°57.0'	-28.8'	114.5°	58°31.5'	-30.4'	116.0°	58°04.5'	-31.9'	117.4°	57°36.3'	-33.3'	118.8°	57°06.7'	-34.7'	120.2°	56°36.0'	-36.0'	121.5°	56°04.1'	-37.2'	122.8°	0
1	58°28.2'	-30.1'	116.2°	58°01.1'	-31.6'	117.6°	57°32.6'	-33.0'	119.0°	57°02.9'	-34.4'	120.3°	56°32.0'	-35.7'	121.7°	55°56.0'	-37.0'	122.9°	55°26.8'	-38.2'	124.1°	1
2	57°58.1'	-31.3'	117.8°	57°29.5'	-32.8'	119.2°	56°59.6'	-34.1'	120.5°	56°28.5'	-35.5'	121.8°	55°56.3'	-36.7'	123.1°	55°23.0'	-37.9'	124.3°	54°48.7'	-39.0'	125.5°	2
3	57°26.8'	-32.5'	119.4°	56°56.7'	-33.9'	120.7°	56°25.5'	-35.2'	122.0°	55°53.1'	-36.4'	123.3°	55°19.6'	-37.6'	124.5°	54°45.1'	-38.8'	125.7°	54°09.6'	-39.9'	126.8°	3
4	56°54.2'	-33.6'	120.9°	56°22.8'	-34.9'	122.2°	55°50.3'	-36.2'	123.5°	55°16.6'	-37.4'	124.7°	54°42.0'	-38.5'	125.9°	54°06.3'	-39.6'	127.0°	53°29.8'	-40.6'	128.1°	4
5	56°20.6'	-34.7'	122.4°	55°47.9'	-35.9'	123.7°	55°14.1'	-37.1'	124.9°	54°39.2'	-38.3'	126.1°	54°03.4'	-39.4'	127.2°	53°26.7'	-40.4'	128.3°	52°49.2'	-41.4'	129.3°	5
6	55°45.9'	-35.7'	123.9°	55°11.9'	-36.9'	125.1°	54°36.9'	-38.0'	126.3°	54°01.0'	-39.1'	127.4°	53°24.1'	-40.1'	128.5°	52°46.3'	-41.1'	129.5°	52°07.8'	-42.1'	130.5°	6
7	55°10.2'	-36.7'	125.3°	54°35.0'	-37.8'	126.5°	53°58.9'	-38.9'	127.6°	53°21.8'	-39.9'	128.7°	52°43.9'	-40.9'	129.7°	52°05.2'	-41.8'	130.7°	51°25.7'	-42.7'	131.6°	7
8	54°33.5'	-37.6'	126.7°	53°57.2'	-38.7'	127.8°	53°20.0'	-39.7'	128.9°	52°41.9'	-40.7'	129.9°	52°03.0'	-41.6'	130.9°	51°23.4'	-42.5'	131.8°	50°43.0'	-43.3'	132.8°	8
9	53°56.0'	-38.4'	128.0°	53°18.6'	-39.5'	129.1°	52°40.3'	-40.4'	130.1°	52°01.2'	-41.4'	131.1°	51°21.4'	-42.3'	132.1°	50°40.9'	-43.1'	133.0°	49°59.7'	-43.9'	133.8°	9
10	53°17.5'	-39.2'	129.3°	52°39.1'	-40.2'	130.3°	51°59.9'	-41.2'	131.3°	51°19.9'	-42.1'	132.3°	50°39.2'	-42.9'	133.2°	49°57.8'	-43.7'	134.1°	49°15.7'	-44.5'	134.9°	10
11	52°38.3'	-40.0'	130.6°	51°58.9'	-41.0'	131.6°	51°18.7'	-41.9'	132.5°	50°37.8'	-42.7'	133.4°	49°56.2'	-43.5'	134.3°	49°14.0'	-44.3'	135.1°	48°31.2'	-45.0'	135.9°	11
12	51°58.3'	-40.8'	131.8°	51°17.9'	-41.6'	132.7°	50°36.8'	-42.5'	133.6°	49°55.1'	-43.3'	134.5°	49°12.7'	-44.1'	135.3°	48°29.8'	-44.8'	136.1°	47°46.2'	-45.5'	136.9°	12
13	51°17.5'	-41.4'	133.0°	50°36.3'	-42.3'	133.9°	49°54.3'	-43.1'	134.7°	49°11.8'	-43.9'	135.6°	48°28.7'	-44.6'	136.4°	47°45.0'	-45.3'	137.1°	47°00.7'	-46.0'	137.9°	13
14	50°36.1'	-42.1'	134.1°	49°54.0'	-42.9'	135.0°	49°11.2'	-43.7'	135.8°	48°27.9'	-44.4'	136.6°	47°44.0'	-45.1'	137.4°	46°59.6'	-45.8'	138.1°	46°14.7'	-46.4'	138.8°	14
15	49°54.0'	-42.7'	135.3°	49°11.0'	-43.5'	136.1°	48°27.5'	-44.2'	136.9°	47°43.5'	-44.9'	137.6°	46°58.9'	-45.6'	138.3°	46°13.9'	-46.2'	139.0°	45°28.3'	-46.8'	139.7°	15
16	49°11.2'	-43.3'	136.3°	48°27.5'	-44.1'	137.1°	47°43.3'	-44.8'	137.9°	46°58.6'	-45.2'	138.9°	46°13.1'	-45.9'	139.5°	45°27.3'	-46.5'	140.2°	44°41.0'	-47.1'	140.8°	16
17	48°27.9'	-43.9'	137.4°	47°43.5'	-44.6'	138.1°	46°58.6'	-45.2'	138.9°	46°13.1'	-45.9'	139.5°	45°27.3'	-46.3'	140.2°	44°40.8'	-46.9'	141.1°	43°53.9'	-47.5'	141.7°	17
18	47°44.0'	-44.4'	138.4°	46°58.9'	-45.1'	139.1°	46°13.3'	-45.7'	139.8°	45°27.3'	-46.3'	140.5°	44°40.8'	-46.9'	141.1°	43°53.9'	-47.5'	141.7°	43°06.6'	-48.0'	142.3°	18
19	46°59.6'	-44.9'	139.4°	46°13.9'	-45.5'	140.1°	45°27.6'	-46.1'	140.7°	44°41.0'	-46.7'	141.4°	43°53.9'	-47.3'	142.0°	43°06.4'	-47.8'	142.6°	42°18.6'	-48.3'	143.1°	19
20	46°14.7'	-45.4'	140.4°	45°28.3'	-46.0'	141.0°	44°41.5'	-46.6'	141.6°	43°54.2'	-47.1'	142.2°	43°06.6'	-47.7'	142.8°	42°18.6'	-48.2'	143.4°	41°30.3'	-48.6'	143.9°	20
21	45°29.4'	-45.8'	141.3°	44°42.3'	-46.4'	141.9°	43°54.9'	-47.0'	142.5°	43°07.1'	-47.5'	143.1°	42°18.9'	-48.0'	143.6°	41°30.5'	-48.5'	144.2°	40°41.7'	-48.9'	144.7°	21
22	44°43.5'	-46.3'	142.2°	43°55.9'	-46.8'	142.8°	43°07.9'	-47.3'	143.4°	42°19.6'	-47.8'	143.9°	41°31.0'	-48.3'	144.5°	40°42.0'	-48.8'	145.0°	39°52.7'	-49.2'	145.4°	22
23	43°57.3'	-46.7'	143.1°	43°09.1'	-47.2'	143.7°	42°20.6'	-47.7'	144.2°	41°31.8'	-48.2'	144.7°	40°42.6'	-48.6'	145.2°	39°53.2'	-49.1'	145.7°	39°03.5'	-49.5'	146.2°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			Dec°

28° 332° LHA

Latitude CONTRARY to DECLINATION

28° 332° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

27° 333° LHA

Latitude CONTRARY to Declination

27° 333° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	59°49.8'	-29.6'	115.4°	59°23.4'	-31.1'	116.9°	58°55.5'	-32.7'	118.4°	58°26.3'	-34.1'	119.8°	57°55.8'	-35.5'	121.2°	57°24.1'	-36.8'	122.6°	56°51.2'	-38.0'	123.9°	0
1	59°20.2'	-30.9'	117.1°	58°52.2'	-32.4'	118.6°	58°22.8'	-33.8'	120.0°	57°52.2'	-35.2'	121.4°	57°20.3'	-36.5'	122.7°	56°47.3'	-37.8'	124.0°	56°13.2'	-38.9'	125.3°	1
2	58°49.3'	-32.1'	118.8°	58°19.8'	-33.6'	120.2°	57°49.0'	-34.9'	121.6°	57°17.0'	-36.3'	122.9°	56°43.8'	-37.5'	124.2°	56°09.6'	-38.7'	125.4°	55°34.3'	-39.8'	126.6°	2
3	58°17.2'	-33.3'	120.4°	57°46.2'	-34.7'	121.8°	57°14.1'	-36.0'	123.1°	56°40.7'	-37.2'	124.4°	56°06.3'	-38.4'	125.6°	55°30.9'	-39.6'	126.8°	54°54.4'	-40.6'	127.9°	3
4	57°43.9'	-34.5'	122.0°	57°11.5'	-35.8'	123.3°	56°38.1'	-37.0'	124.6°	56°03.5'	-38.2'	125.8°	55°27.9'	-39.3'	127.0°	54°51.3'	-40.4'	128.1°	54°13.8'	-41.4'	129.2°	4
5	57°09.5'	-35.5'	123.5°	56°35.8'	-36.8'	124.8°	56°01.0'	-38.0'	126.0°	55°25.3'	-39.1'	127.2°	54°48.6'	-40.1'	128.3°	54°10.9'	-41.2'	129.4°	53°32.4'	-42.1'	130.4°	5
6	56°33.9'	-36.5'	125.0°	55°59.0'	-37.7'	126.2°	55°23.1'	-38.8'	127.4°	54°46.2'	-39.9'	128.5°	54°08.4'	-40.9'	129.6°	53°29.8'	-41.9'	130.6°	52°50.3'	-42.8'	131.6°	6
7	55°57.4'	-37.5'	126.4°	55°21.3'	-38.6'	127.6°	54°44.2'	-39.7'	128.7°	54°06.3'	-40.7'	129.8°	53°27.5'	-41.7'	130.8°	52°47.9'	-42.6'	131.8°	52°07.5'	-43.5'	132.8°	7
8	55°19.9'	-38.4'	127.8°	54°42.7'	-39.5'	128.9°	54°04.5'	-40.5'	130.0°	53°25.6'	-41.5'	131.0°	52°45.8'	-42.4'	132.0°	52°05.3'	-43.3'	133.0°	51°24.0'	-44.1'	133.9°	8
9	54°41.5'	-39.3'	129.1°	54°03.2'	-40.3'	130.2°	53°24.1'	-41.3'	131.2°	52°44.1'	-42.2'	132.2°	52°03.4'	-43.0'	133.2°	51°22.0'	-43.9'	134.1°	50°39.9'	-44.7'	135.0°	9
10	54°02.2'	-40.1'	130.4°	53°22.9'	-41.0'	131.4°	52°42.8'	-42.0'	132.4°	52°01.9'	-42.8'	133.4°	51°20.4'	-43.7'	134.3°	50°38.1'	-44.5'	135.2°	49°55.3'	-45.2'	136.0°	10
11	53°22.1'	-40.8'	131.7°	52°41.9'	-41.8'	132.7°	52°00.8'	-42.6'	133.6°	51°19.1'	-43.5'	134.5°	50°36.7'	-44.3'	135.4°	49°53.7'	-45.0'	136.2°	49°10.1'	-45.7'	137.0°	11
12	52°41.3'	-41.6'	132.9°	52°00.1'	-42.4'	133.8°	51°18.2'	-43.3'	134.7°	50°35.6'	-44.1'	135.6°	49°52.5'	-44.8'	136.4°	49°08.7'	-45.5'	137.2°	48°24.4'	-46.2'	138.0°	12
13	51°59.7'	-42.3'	134.1°	51°17.6'	-43.1'	135.0°	50°34.9'	-43.9'	135.8°	49°51.6'	-44.6'	136.7°	49°07.6'	-45.3'	137.5°	48°23.2'	-46.0'	138.2°	47°38.1'	-46.7'	139.0°	13
14	51°17.5'	-42.9'	135.2°	50°34.6'	-43.7'	136.1°	49°51.0'	-44.4'	136.9°	49°06.9'	-45.2'	137.7°	48°22.3'	-45.8'	138.5°	47°37.1'	-46.5'	139.2°	46°51.5'	-47.1'	139.9°	14
15	50°34.6'	-43.5'	136.3°	49°50.9'	-44.3'	137.2°	49°06.6'	-45.0'	137.9°	48°21.8'	-45.7'	138.7°	47°36.5'	-46.3'	139.4°	46°50.6'	-46.9'	140.1°	46°04.4'	-47.5'	140.8°	15
16	49°51.0'	-44.1'	137.4°	49°06.6'	-44.8'	138.2°	48°21.6'	-45.5'	138.9°	47°36.1'	-46.1'	139.7°	46°50.1'	-46.8'	140.4°	46°03.7'	-47.3'	141.0°	45°16.9'	-47.9'	141.7°	16
17	49°06.9'	-44.6'	138.4°	48°21.8'	-45.3'	139.2°	47°36.1'	-46.0'	139.9°	46°50.0'	-46.6'	140.6°	46°03.4'	-47.2'	141.3°	45°16.4'	-47.7'	141.9°	44°28.9'	-48.3'	142.5°	17
18	48°22.3'	-45.2'	139.5°	47°36.5'	-45.8'	140.2°	46°50.1'	-46.4'	140.9°	46°03.4'	-47.0'	141.5°	45°16.2'	-47.6'	142.2°	44°28.6'	-48.1'	142.8°	43°40.7'	-48.6'	143.3°	18
19	47°37.1'	-45.7'	140.4°	46°50.6'	-46.3'	141.1°	46°03.7'	-46.9'	141.8°	45°16.4'	-47.4'	142.4°	44°28.6'	-48.0'	143.0°	43°40.5'	-48.5'	143.6°	42°52.1'	-49.0'	144.1°	19
20	46°51.5'	-46.1'	141.4°	46°04.4'	-46.7'	142.1°	45°16.9'	-47.3'	142.7°	44°28.9'	-47.8'	143.3°	43°40.7'	-48.3'</								

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

26° 334° LHA

Latitude CONTRARY to Declination

26° 334° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	60°42.1'	-30.4'	116.4°	60°14.8'	-31.9'	118.0°	59°46.0'	-33.5'	119.5°	59°15.8'	-34.9'	120.9°	58°44.3'	-36.3'	122.4°	58°11.6'	-37.6'	123.7°	57°37.7'	-38.8'	125.0°	0
1	60°11.8'	-31.7'	118.1°	59°42.8'	-33.2'	119.6°	59°12.5'	-34.7'	121.1°	58°40.9'	-36.0'	122.5°	58°08.0'	-37.3'	123.9°	57°34.0'	-38.6'	125.2°	56°58.9'	-39.7'	126.5°	1
2	59°40.1'	-33.0'	119.8°	59°09.6'	-34.4'	121.3°	58°37.8'	-35.8'	122.7°	58°04.8'	-37.1'	124.0°	57°30.7'	-38.3'	125.3°	56°55.4'	-39.5'	126.6°	56°19.1'	-40.6'	127.8°	2
3	59°07.2'	-34.2'	121.5°	58°35.2'	-35.5'	122.9°	58°02.1'	-36.8'	124.2°	57°27.8'	-38.1'	125.5°	56°52.4'	-39.2'	126.8°	56°15.9'	-40.4'	128.0°	55°38.6'	-41.4'	129.1°	3
4	58°33.0'	-35.3'	123.1°	57°59.7'	-36.6'	124.4°	57°25.2'	-37.8'	125.7°	56°49.7'	-39.0'	126.9°	56°13.1'	-40.1'	128.1°	55°35.6'	-41.2'	129.3°	54°57.1'	-42.2'	130.4°	4
5	57°57.7'	-36.4'	124.6°	57°23.1'	-37.6'	125.9°	56°47.4'	-38.8'	127.1°	56°10.7'	-39.9'	128.3°	55°33.0'	-41.0'	129.5°	54°54.4'	-42.0'	130.6°	54°15.0'	-42.9'	131.6°	5
6	57°21.3'	-37.4'	126.1°	56°45.5'	-38.6'	127.3°	56°08.6'	-39.7'	128.5°	55°30.8'	-40.7'	129.6°	54°52.0'	-41.7'	130.7°	54°12.4'	-42.7'	131.8°	53°32.1'	-43.6'	132.8°	6
7	56°43.9'	-38.4'	127.5°	56°06.9'	-39.5'	128.7°	55°28.9'	-40.5'	129.8°	54°50.0'	-41.5'	130.9°	54°10.3'	-42.5'	132.0°	53°29.8'	-43.4'	133.0°	52°48.5'	-44.2'	134.0°	7
8	56°05.6'	-39.3'	128.9°	55°27.4'	-40.3'	130.0°	54°48.4'	-41.3'	131.1°	54°08.5'	-42.3'	132.2°	53°27.8'	-43.2'	133.2°	52°46.4'	-44.0'	134.1°	52°04.2'	-44.8'	135.1°	8
9	55°26.3'	-40.1'	130.3°	54°47.1'	-41.1'	131.3°	54°07.0'	-42.1'	132.4°	53°26.2'	-43.0'	133.4°	52°44.6'	-43.8'	134.3°	52°02.4'	-44.6'	135.3°	51°19.4'	-45.4'	136.1°	9
10	54°46.2'	-40.9'	131.6°	54°06.0'	-41.9'	132.6°	53°25.0'	-42.8'	133.6°	52°43.2'	-43.6'	134.5°	52°00.8'	-44.4'	135.5°	51°17.7'	-45.2'	136.3°	50°34.0'	-45.9'	137.2°	10
11	54°05.2'	-41.7'	132.8°	53°24.1'	-42.6'	133.8°	52°42.2'	-43.4'	134.8°	51°59.6'	-44.3'	135.7°	51°16.4'	-45.0'	136.5°	50°32.5'	-45.7'	137.4°	49°48.1'	-46.4'	138.2°	11
12	53°23.6'	-42.4'	134.0°	52°41.5'	-43.3'	135.0°	51°58.8'	-44.1'	135.9°	51°15.4'	-44.8'	136.8°	50°31.4'	-45.6'	137.6°	49°46.8'	-46.3'	138.4°	49°01.6'	-46.9'	139.2°	12
13	52°41.2'	-43.1'	135.2°	51°58.2'	-43.9'	136.1°	51°14.7'	-44.7'	137.0°	50°30.5'	-45.4'	137.8°	49°45.8'	-46.1'	138.6°	49°00.5'	-46.7'	139.4°	48°14.7'	-47.4'	140.1°	13
14	51°58.1'	-43.7'	136.3°	51°14.3'	-44.5'	137.2°	50°30.0'	-45.2'	138.0°	49°45.1'	-45.9'	138.8°	48°59.7'	-46.6'	139.6°	48°13.8'	-47.2'	140.3°	47°27.4'	-47.8'	141.0°	14
15	51°14.3'	-44.3'	137.4°	50°29.9'	-45.1'	138.3°	49°44.8'	-45.7'	139.1°	48°59.2'	-46.4'	139.8°	48°13.1'	-47.0'	140.5°	47°26.6'	-47.6'	141.2°	46°39.6'	-48.2'	141.9°	15
16	50°30.0'	-44.9'	138.5°	49°44.8'	-45.6'	139.3°	48°59.1'	-46.2'	140.1°	48°12.8'	-46.9'	140.8°	47°26.1'	-47.5'	141.5°	46°39.0'	-48.0'	142.1°	45°51.4'	-48.6'	142.8°	16
17	49°45.1'	-45.4'	139.5°	48°59.2'	-46.1'	140.3°	48°12.8'	-46.7'	141.0°	47°26.0'	-47.3'	141.7°	46°38.7'	-47.9'	142.4°	45°50.9'	-48.4'	143.0°	45°02.8'	-48.9'	143.6°	17
18	48°59.7'	-45.9'	140.5°	48°13.1'	-46.6'	141.3°	47°26.1'	-47.2'	141.9°	46°38.7'	-47.7'	142.6°	45°50.8'	-48.3'	143.2°	45°02.5'	-48.8'	143.8°	44°13.9'	-49.3'	144.4°	18
19	48°13.8'	-46.4'	141.5°	47°26.6'	-47.0'	142.2°	46°39.0'	-47.6'	142.9°	45°50.9'	-48.1'	143.5°	45°02.5'	-48.6'	144.1°	44°13.8'	-49.1'	144.7°	43°24.6'	-49.6'	145.2°	19
20	47°27.4'	-46.9'	142.5°	46°39.6'	-47.4'	143.1°	45°51.4'	-48.0'	143.7°	45°02.8'	-48.5'	144.3°	44°13.9'	-49.0'	144.9°	43°24.6'	-49.4'	145.5°	42°35.1'	-49.9'	146.0°	20
21	46°40.5'	-47.3'	143.4°	45°52.2'	-47.8'	144.0°	45°03.4'	-48.3'	144.6°	44°14.4'	-48.8'	145.2°	43°24.9'	-49.3'	145.7°	42°35.2'	-49.7'	146.2°	41°45.2'	-50.2'	146.7°	21
22	45°53.2'	-47.7'	144.3°	45°04.3'	-48.2'	144.9°	44°15.1'	-48.7'	145.4°	43°25.5'	-49.2'	146.0°	42°35.6'	-49.6'	146.5°	41°45.5'	-50.0'	147.0°	40°55.0'	-50.4'	147.5°	22
23	45°05.5'	-48.1'	145.1°	44°16.1'	-48.6'	145.7°	43°26.4'	-49.0'	146.2°	42°36.4'	-49.5'	146.8°	41°46.0'	-49.9'	147.2°	40°55.5'	-50.3'	147.7°	40°04.6'	-50.7'	148.2°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

26° 334° LHA

Latitude CONTRARY to DECLINATION

26° 334° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

25° 335° LHA

Latitude CONTRARY to Declination

25° 335° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	61°34.1'	-31.2'	117.4°	61°05.7'	-32.8'	119.0°	60°35.9'	-34.3'	120.6°	60°04.7'	-35.8'	122.1°	59°32.2'	-37.1'	123.5°	58°58.4'	-38.4'	124.9°	58°23.5'	-39.6'	126.3°	0
1	61°02.9'	-32.6'	119.2°	60°32.9'	-34.1'	120.7°	60°01.6'	-35.5'	122.2°	59°28.9'	-36.9'	123.7°	58°55.1'	-38.2'	125.1°	58°20.0'	-39.4'	126.4°	57°43.9'	-40.6'	127.7°	1
2	60°30.3'	-33.8'	120.9°	59°58.9'	-35.3'	122.4°	59°26.1'	-36.6'	123.8°	58°52.1'	-37.9'	125.2°	58°16.9'	-39.2'	126.5°	57°40.6'	-40.3'	127.8°	57°03.3'	-41.4'	129.0°	2
3	59°56.5'	-35.0'	122.6°	59°23.6'	-36.4'	124.0°	58°49.4'	-37.7'	125.4°	58°14.1'	-38.9'	126.7°	57°37.7'	-40.1'	128.0°	57°00.3'	-41.2'	129.2°	56°21.9'	-42.2'	130.4°	3
4	59°21.5'	-36.2'	124.2°	58°47.2'	-37.5'	125.6°	58°11.7'	-38.7'	126.9°	57°35.2'	-39.9'	128.1°	56°57.6'	-41.0'	129.4°	56°19.1'	-42.0'	130.5°	55°39.7'	-43.0'	131.6°	4
5	58°45.3'	-37.3'	125.7°	58°09.7'	-38.5'	127.1°	57°33.0'	-39.7'	128.3°	56°55.3'	-40.8'	129.5°	56°16.7'	-41.8'	130.7°	55°37.1'	-42.8'	131.8°	54°56.7'	-43.7'	132.9°	5
6	58°08.0'	-38.3'	127.2°	57°31.2'	-39.4'	128.5°	56°53.3'	-40.5'	129.7°	56°14.6'	-41.6'	130.9°	55°34.9'	-42.6'	132.0°	54°54.3'	-43.5'	133.0°	54°13.0'	-44.4'	134.0°	6
7	57°29.7'	-39.2'	128.7°	56°51.7'	-40.3'	129.9°	56°12.8'	-41.4'	131.0°	55°33.0'	-42.4'	132.1°	54°52.3'	-43.3'	133.2°	54°10.8'	-44.2'	134.2°	53°28.6'	-45.0'	135.2°	7
8	56°50.5'	-40.1'	130.1°	56°11.4'	-41.2'	131.2°	55°31.4'	-42.2'	132.3°	54°50.6'	-43.1'	133.4°	54°09.0'	-44.0'	134.4°	53°26.7'	-44.8'	135.4°	52°43.6'	-45.6'	136.3°	8
9	56°10.3'	-41.0'	131.4°	55°30.2'	-42.0'	132.5°	54°49.2'	-42.9'	133.6°	54°07.5'	-43.8'	134.6°	53°25.0'	-44.6'	135.5°	52°41.9'	-45.4'	136.5°	51°58.1'	-46.1'	137.4°	9
10	55°29.3'	-41.8'	132.7°	54°48.2'	-42.7'	133.8°	54°06.3'	-43.6'	134.8°	53°23.7'	-44.4'	135.7°	52°40.4'	-45.2'	136.7°	51°56.5'	-46.0'	137.5°	51°11.9'	-46.7'	138.4°	10
11	54°47.5'	-42.5'	134.0°	54°05.5'	-43.4'	135.0°	53°22.7'	-44.3'	135.9°	52°39.3'	-45.0'	136.9°	51°55.2'	-45.8'	137.7°	51°10.5'	-46.5'	138.6°	50°25.2'	-47.2'	139.4°	11
12	54°05.0'	-43.3'	135.2°	53°22.1'	-44.1'	136.1°	52°38.5'	-44.9'	137.1°	51°54.2'	-45.6'	137.9°	51°09.4'	-46.3'	138.8°	50°24.0'	-47.0'	139.6°	49°38.1'	-47.6'	140.3°	12
13	53°21.8'	-43.9'	136.4°	52°38.0'	-44.7'	137.3°	51°53.6'	-45.4'	138.1°	51°08.6'	-46.2'	139.0°	50°23.1'	-46.8'	139.8°	49°37.0'	-47.5'	140.5°	48°50.5'	-48.1'	141.3°	13
14	52°37.8'	-44.5'	137.5°	51°53.3'	-45.3'	138.4°	51°08.2'	-46.0'	139.2°	50°22.5'	-46.7'	140.0°	49°36.3'	-47.3'	140.7°	48°49.6'	-47.9'	141.5°	48°02.4'	-48.5'	142.2°	14
15	51°53.3'	-45.1'	138.6°	51°08.0'	-45.8'	139.4°	50°22.2'	-46.5'	140.2°	49°35.8'	-47.1'	141.0°	48°49.0'	-47.7'	141.7°	48°01.7'	-48.3'	142.4°	47°13.9'	-48.9'	143.0°	15
16	51°08.2'	-45.7'	139.7°	50°22.2'	-46.4'	140.4°	49°35.7'	-47.0'	141.2°	48°48.7'	-47.6'	141.9°	48°01.2'	-48.2'	142.6°	47°13.3'	-48.7'	143.3°	46°25.1'	-49.2'	143.9°	16
17	50°22.5'	-46.2'	140.7°	49°35.8'	-46.8'	141.4°	48°48.7'	-47.4'	142.1°	48°01.1'	-48.0'	142.8°	47°13.1'	-48.6'	143.5°	46°24.6'	-49.1'	144.1°	45°35.8'	-49.6'	144.7°	17
18	49°36.3'	-46.7'	141.7°	48°49.0'	-47.3'	142.4°	48°01.2'	-47.9'	143.1°	47°13.1'	-48.4'	143.7°	46°24.5'	-48.9'	144.3°	45°35.6'	-49.4'	144.9°	44°46.3'	-49.9'	145.5°	18
19	48°49.6'	-47.2'	142.6°	48°01.7'	-47.7'	143.3°	47°13.3'	-48.3'	144.0°	46°24.6'	-48.8'	144.6°	45°35.6'	-49.3'	145.2°	44°46.1'	-49.8'	145.7°	43°56.4'	-50.2'	146.3°	19
20	48°02.4'	-47.6'	143.6°	47°13.9'	-48.1'	144.2°	46°25.1'	-48.7'	144.8°	45°35.8'	-49.2'	145.4°	44°46.3'	-49.6'	146.0°							

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

24° 336° LHA

Latitude CONTRARY to Declination

24° 336° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	62°25.5'	-32.1'	118.5°	61°56.1'	-33.7'	120.2°	61°25.2'	-35.2'	121.8°	60°53.0'	-36.6'	123.3°	60°19.4'	-38.0'	124.8°	59°44.6'	-39.3'	126.2°	59°08.6'	-40.5'	127.5°	0
1	61°53.4'	-33.4'	120.3°	61°22.4'	-35.0'	121.9°	60°50.0'	-36.4'	123.4°	60°16.3'	-37.8'	124.9°	59°41.4'	-39.1'	126.3°	59°05.3'	-40.3'	127.7°	58°28.1'	-41.4'	129.0°	1
2	61°20.0'	-34.7'	122.1°	60°47.5'	-36.2'	123.6°	60°13.6'	-37.5'	125.1°	59°38.6'	-38.8'	126.5°	59°02.4'	-40.0'	127.8°	58°25.0'	-41.2'	129.1°	57°46.7'	-42.3'	130.3°	2
3	60°45.3'	-36.0'	123.8°	60°11.3'	-37.3'	125.2°	59°36.1'	-38.6'	126.6°	58°59.7'	-39.8'	128.0°	58°22.3'	-41.0'	129.2°	57°43.9'	-42.0'	130.5°	57°04.5'	-43.1'	131.6°	3
4	60°09.3'	-37.1'	125.4°	59°34.0'	-38.4'	126.8°	58°57.5'	-39.6'	128.1°	58°19.9'	-40.8'	129.4°	57°41.4'	-41.8'	130.6°	57°01.8'	-42.8'	131.8°	56°21.4'	-43.8'	132.9°	4
5	59°32.2'	-38.2'	126.9°	58°55.6'	-39.4'	128.3°	58°17.9'	-40.5'	129.6°	57°39.2'	-41.6'	130.8°	56°59.5'	-42.6'	131.9°	56°19.0'	-43.6'	133.1°	55°37.6'	-44.5'	134.1°	5
6	58°54.0'	-39.2'	128.5°	58°16.2'	-40.4'	129.7°	57°37.3'	-41.4'	130.9°	56°57.5'	-42.4'	132.1°	56°16.9'	-43.4'	133.2°	55°35.4'	-44.3'	134.3°	54°53.1'	-45.2'	135.3°	6
7	58°14.8'	-40.2'	129.9°	57°35.8'	-41.2'	131.1°	56°55.9'	-42.3'	132.3°	56°15.1'	-43.2'	133.4°	55°33.5'	-44.1'	134.5°	54°51.1'	-45.0'	135.5°	54°07.9'	-45.8'	136.4°	7
8	57°34.6'	-41.1'	131.3°	56°54.6'	-42.1'	132.5°	56°13.6'	-43.0'	133.6°	55°31.9'	-43.9'	134.6°	54°49.3'	-44.8'	135.6°	54°06.1'	-45.6'	136.6°	53°22.2'	-46.4'	137.5°	8
9	56°53.6'	-41.9'	132.7°	56°12.5'	-42.9'	133.8°	55°30.6'	-43.8'	134.8°	54°47.9'	-44.6'	135.8°	54°04.6'	-45.4'	136.8°	53°20.5'	-46.2'	137.7°	52°35.8'	-46.9'	138.6°	9
10	56°11.7'	-42.7'	134.0°	55°29.6'	-43.6'	135.0°	54°46.8'	-44.4'	136.0°	54°03.3'	-45.2'	137.0°	53°19.1'	-46.0'	137.9°	52°34.3'	-46.7'	138.8°	51°48.9'	-47.4'	139.6°	10
11	55°29.0'	-43.4'	135.2°	54°46.1'	-44.3'	136.2°	54°02.4'	-45.1'	137.2°	53°18.1'	-45.8'	138.1°	52°33.1'	-46.6'	139.0°	51°47.6'	-47.2'	139.8°	51°01.5'	-47.9'	140.6°	11
12	54°45.6'	-44.1'	136.4°	54°01.8'	-44.9'	137.4°	53°17.3'	-45.7'	138.3°	52°32.2'	-46.4'	139.1°	51°46.6'	-47.1'	140.0°	51°00.3'	-47.7'	140.8°	50°13.6'	-48.3'	141.5°	12
13	54°01.5'	-44.8'	137.6°	53°16.9'	-45.5'	138.5°	52°31.6'	-46.2'	139.4°	51°45.8'	-46.9'	140.2°	50°59.5'	-47.6'	141.0°	50°12.6'	-48.2'	141.7°	49°25.3'	-48.8'	142.5°	13
14	53°16.7'	-45.4'	138.7°	52°31.3'	-46.1'	139.6°	51°45.4'	-46.8'	140.4°	50°58.9'	-47.4'	141.2°	50°11.9'	-48.0'	141.9°	49°24.4'	-48.6'	142.7°	48°36.5'	-49.2'	143.4°	14
15	52°31.3'	-45.9'	139.8°	51°45.3'	-46.6'	140.6°	50°58.6'	-47.3'	141.4°	50°11.5'	-47.9'	142.1°	49°23.9'	-48.5'	142.9°	48°35.8'	-49.0'	143.6°	47°47.4'	-49.5'	144.2°	15
16	51°45.4'	-46.5'	140.8°	50°58.6'	-47.1'	141.6°	50°11.3'	-47.7'	142.4°	49°23.6'	-48.3'	143.1°	48°35.4'	-48.9'	143.8°	47°46.8'	-49.4'	144.4°	46°57.8'	-49.9'	145.0°	16
17	50°58.9'	-47.0'	141.8°	50°11.5'	-47.6'	142.6°	49°23.6'	-48.2'	143.3°	48°35.3'	-48.7'	144.0°	47°46.6'	-49.3'	144.6°	46°57.4'	-49.7'	145.3°	46°08.0'	-50.2'	145.9°	17
18	50°11.9'	-47.5'	142.8°	49°23.9'	-48.1'	143.5°	48°35.4'	-48.6'	144.2°	47°46.6'	-49.1'	144.9°	46°57.3'	-49.6'	145.5°	46°07.7'	-50.1'	146.1°	45°17.7'	-50.5'	146.6°	18
19	49°24.4'	-47.9'	143.8°	48°35.8'	-48.5'	144.4°	47°46.8'	-49.0'	145.1°	46°57.4'	-49.5'	145.7°	46°07.7'	-50.0'	146.3°	45°17.6'	-50.4'	146.9°	44°27.2'	-50.8'	147.4°	19
20	48°36.5'	-48.3'	144.7°	47°47.4'	-48.9'	145.3°	46°57.8'	-49.4'	145.9°	46°08.0'	-49.8'	146.5°	45°17.7'	-50.3'	147.1°	44°27.2'	-50.7'	147.6°	43°36.4'	-51.1'	148.1°	20
21	47°48.2'	-48.7'	145.6°	46°58.5'	-49.2'	146.2°	46°08.5'	-49.7'	146.8°	45°18.1'	-50.1'	147.3°	44°27.5'	-50.6'	147.9°	43°36.5'	-51.0'	148.4°	42°45.3'	-51.4'	148.9°	21
22	46°59.4'	-49.1'	146.4°	46°09.3'	-49.6'	147.0°	45°18.8'	-50.0'	147.6°	44°28.0'	-50.5'	148.1°	43°36.9'	-50.9'	148.6°	42°45.5'	-51.2'	149.1°	41°53.9'	-51.6'	149.6°	22
23	46°10.3'	-49.5'	147.3°	45°19.7'	-49.9'	147.8°	44°28.7'	-50.3'	148.3°	43°37.5'	-50.7'	148.9°	42°46.0'	-51.1'	149.3°	41°54.3'	-51.5'	149.8°	41°02.3'	-51.8'	150.2°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

24° 336° LHA

Latitude CONTRARY to DECLINATION

24° 336° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

23° 337° LHA

Latitude CONTRARY to Declination

23° 337° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	63°16.3'	-33.0'	119.7°	62°45.9'	-34.6'	121.4°	62°14.0'	-36.1'	123.0°	61°40.6'	-37.6'	124.6°	61°05.9'	-38.9'	126.1°	60°30.0'	-40.2'	127.5°	59°52.9'	-41.4'	128.9°	0
1	62°43.3'	-34.4'	121.5°	62°11.3'	-35.9'	123.1°	61°37.8'	-37.3'	124.7°	61°03.0'	-38.7'	126.2°	60°27.0'	-40.0'	127.6°	59°49.8'	-41.2'	129.0°	59°11.5'	-42.3'	130.3°	1
2	62°09.0'	-35.7'	123.3°	61°35.4'	-37.1'	124.8°	61°00.5'	-38.5'	126.3°	60°24.3'	-39.7'	127.7°	59°47.0'	-40.9'	129.1°	59°08.7'	-42.1'	130.4°	58°29.3'	-43.1'	131.7°	2
3	61°33.3'	-36.9'	125.0°	60°58.3'	-38.3'	126.5°	60°22.0'	-39.5'	127.9°	59°44.6'	-40.7'	129.3°	59°06.1'	-41.9'	130.5°	58°26.6'	-42.9'	131.8°	57°46.1'	-43.9'	133.0°	3
4	60°56.4'	-38.1'	126.6°	60°20.0'	-39.3'	128.0°	59°42.5'	-40.5'	129.4°	59°03.9'	-41.7'	130.7°	58°24.2'	-42.7'	131.9°	57°43.7'	-43.7'	133.1°	57°02.2'	-44.6'	134.2°	4
5	60°18.3'	-39.1'	128.2°	59°40.7'	-40.3'	129.6°	59°01.9'	-41.5'	130.8°	58°22.2'	-42.5'	132.1°	57°41.5'	-43.5'	133.3°	56°60.0'	-44.4'	134.4°	56°17.6'	-45.3'	135.5°	5
6	59°39.2'	-40.2'	129.7°	59°00.3'	-41.3'	131.0°	58°20.5'	-42.3'	132.2°	57°39.7'	-43.3'	133.4°	56°58.0'	-44.3'	134.5°	56°15.5'	-45.1'	135.6°	55°32.3'	-46.0'	136.6°	6
7	58°59.0'	-41.1'	131.2°	58°19.0'	-42.2'	132.4°	57°38.1'	-43.1'	133.6°	56°56.3'	-44.1'	134.7°	56°13.7'	-45.0'	135.8°	55°30.4'	-45.8'	136.8°	54°46.3'	-46.6'	137.8°	7
8	58°17.9'	-42.0'	132.6°	57°36.9'	-43.0'	133.7°	56°55.0'	-43.9'	134.9°	56°12.3'	-44.8'	135.9°	55°28.8'	-45.6'	136.9°	54°44.6'	-46.4'	137.9°	53°59.7'	-47.1'	138.8°	8
9	57°36.0'	-42.8'	133.9°	56°53.9'	-43.7'	135.0°	56°11.1'	-44.6'	136.1°	55°27.5'	-45.5'	137.1°	54°43.2'	-46.2'	138.1°	53°58.2'	-47.0'	139.0°	53°12.6'	-47.7'	139.9°	9
10	56°53.1'	-43.6'	135.2°	56°10.2'	-44.5'	136.3°	55°26.4'	-45.3'	137.3°	54°42.0'	-46.1'	138.2°	53°56.9'	-46.8'	139.2°	53°11.2'	-47.5'	140.0°	52°25.0'	-48.2'	140.9°	10
11	56°09.6'	-44.3'	136.5°	55°25.7'	-45.1'	137.5°	54°41.2'	-45.9'	138.4°	53°55.9'	-46.7'	139.3°	53°10.1'	-47.3'	140.2°	52°23.7'	-48.0'	141.1°	51°36.8'	-48.6'	141.9°	11
12	55°25.3'	-45.0'	137.7°	54°40.6'	-45.8'	138.6°	53°55.2'	-46.5'	139.5°	53°09.3'	-47.2'	140.4°	52°22.8'	-47.8'	141.2°	51°35.7'	-48.5'	142.0°	50°48.2'	-49.0'	142.8°	12
13	54°40.3'	-45.6'	138.8°	53°54.8'	-46.4'	139.7°	53°08.7'	-47.0'	140.6°	52°22.1'	-47.7'	141.4°	51°34.9'	-48.3'	142.2°	50°47.3'	-48.9'	143.0°	49°59.1'	-49.5'	143.7°	13
14	53°54.7'	-46.2'	139.9°	53°08.5'	-46.9'	140.8°	52°21.7'	-47.6'	141.6°	51°34.4'	-48.2'	142.4°	50°46.6'	-48.8'	143.2°	49°58.4'	-49.3'	143.9°	49°09.7'	-49.8'	144.6°	14
15	53°08.5'	-46.8'	141.0°	52°21.6'	-47.4'	141.8°	51°34.1'	-48.0'	142.6°	50°46.2'	-48.6'	143.4°	49°57.9'	-49.2'	144.1°	49°09.1'	-49.7'	144.8°	48°19.9'	-50.2'	145.4°	15
16	52°21.7'	-47.3'	142.0°	51°34.1'	-47.9'	142.8°	50°46.1'	-48.5'	143.6°	49°57.6'	-49.0'	144.3°	49°08.7'	-49.6'	145.0°	48°19.4'	-50.1'	145.6°	47°29.7'	-50.5'	146.2°	16
17	51°34.4'	-47.8'	143.0°	50°46.2'	-48.4'	143.8°	49°57.6'	-48.9'	144.5°	49°08.5'	-49.4'	145.2°	48°19.1'	-49.9'	145.8°	47°29.3'	-50.4'	146.4°	46°39.1'	-50.9'	147.0°	17
18	50°46.6'	-48.2'	144.0°	49°57.9'	-48.8'	144.7°	49°08.7'	-49.3'	145.4°	48°19.1'	-49.8'	146.0°	47°29.2'	-50.3'	146.6°	46°38.9'	-50.7'	147.2°	45°48.3'	-51.1'	147.8°	18
19	49°58.4'	-48.7'	144.9°	49°09.1'	-49.2'	145.6°	48°19.4'	-49.7'	146.2°	47°29.3'	-50.2'	146.9°	46°38.9'	-50.6'	147.4°	45°48.2'	-51.0'	148.0°	44°57.1'	-51.4'	148.5°	19
20	49°09.7'	-49.1'	145.8°	48°19.9'	-49.6'	146.5°	47°29.7'	-50.0'	147.1°	46°39.1'	-50.5'	147.7°	45°48.3'	-50.9'	148.2°							

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

22° 338° LHA

Latitude CONTRARY to Declination

22° 338° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	64°06.6'	-34.0'	120.9°	63°35.1'	-35.6'	122.6°	63°02.0'	-37.1'	124.3°	62°27.5'	-38.5'	125.9°	61°51.6'	-39.9'	127.4°	61°14.6'	-41.1'	128.9°	60°36.4'	-42.3'	130.2°	0
1	63°32.6'	-35.4'	122.8°	62°59.5'	-36.9'	124.4°	62°24.9'	-38.3'	126.0°	61°48.9'	-39.7'	127.5°	61°11.8'	-40.9'	129.0°	60°33.5'	-42.1'	130.4°	59°54.1'	-43.2'	131.7°	1
2	62°57.3'	-36.7'	124.6°	62°22.6'	-38.1'	126.2°	61°46.5'	-39.4'	127.7°	61°09.3'	-40.7'	129.1°	60°30.9'	-41.9'	130.5°	59°51.4'	-43.0'	131.8°	59°10.9'	-44.0'	133.0°	2
3	62°20.6'	-37.9'	126.3°	61°44.5'	-39.3'	127.8°	61°07.1'	-40.5'	129.2°	60°28.6'	-41.7'	130.6°	59°49.0'	-42.8'	131.9°	59°08.4'	-43.8'	133.2°	58°26.9'	-44.8'	134.4°	3
4	61°42.7'	-39.1'	128.0°	61°05.2'	-40.3'	129.4°	60°26.6'	-41.5'	130.8°	59°46.9'	-42.6'	132.1°	59°06.2'	-43.6'	133.3°	58°24.6'	-44.6'	134.5°	57°42.2'	-45.5'	135.6°	4
5	61°03.7'	-40.1'	129.5°	60°24.9'	-41.3'	130.9°	59°45.1'	-42.4'	132.2°	59°04.3'	-43.4'	133.4°	58°22.6'	-44.4'	134.6°	57°40.0'	-45.3'	135.8°	56°56.7'	-46.2'	136.8°	5
6	60°23.5'	-41.1'	131.1°	59°43.6'	-42.2'	132.4°	59°02.7'	-43.3'	133.6°	58°20.9'	-44.2'	134.8°	57°38.2'	-45.1'	135.9°	56°54.7'	-46.0'	137.0°	56°10.5'	-46.8'	138.0°	6
7	59°42.4'	-42.1'	132.5°	59°01.4'	-43.1'	133.7°	58°19.4'	-44.1'	134.9°	57°36.7'	-45.0'	136.0°	56°53.1'	-45.8'	137.1°	56°08.8'	-46.6'	138.1°	55°23.7'	-47.4'	139.1°	7
8	59°00.3'	-42.9'	133.9°	58°18.3'	-43.9'	135.1°	57°35.4'	-44.8'	136.2°	56°51.7'	-45.7'	137.3°	56°07.3'	-46.5'	138.3°	55°22.1'	-47.2'	139.2°	54°36.4'	-47.9'	140.2°	8
9	58°17.4'	-43.7'	135.3°	57°34.4'	-44.6'	136.4°	56°50.6'	-45.5'	137.4°	56°06.0'	-46.3'	138.4°	55°20.8'	-47.1'	139.4°	54°34.9'	-47.8'	140.3°	53°48.4'	-48.4'	141.2°	9
10	57°33.7'	-44.5'	136.5°	56°49.7'	-45.3'	137.6°	56°05.1'	-46.1'	138.6°	55°19.7'	-46.9'	139.6°	54°33.7'	-47.6'	140.5°	53°47.2'	-48.3'	141.4°	53°00.0'	-48.9'	142.2°	10
11	56°49.2'	-45.2'	137.8°	56°04.4'	-46.0'	138.8°	55°18.9'	-46.8'	139.7°	54°32.8'	-47.5'	140.7°	53°46.1'	-48.1'	141.5°	52°58.9'	-48.8'	142.4°	52°11.1'	-49.3'	143.1°	11
12	56°04.0'	-45.9'	139.0°	55°18.4'	-46.6'	139.9°	54°32.2'	-47.3'	140.8°	53°45.4'	-48.0'	141.7°	52°58.0'	-48.6'	142.5°	52°10.1'	-49.2'	143.3°	51°21.8'	-49.8'	144.1°	12
13	55°18.1'	-46.5'	140.1°	54°31.8'	-47.2'	141.0°	53°44.8'	-47.9'	141.9°	52°57.4'	-48.5'	142.7°	52°09.4'	-49.1'	143.5°	51°20.9'	-49.6'	144.2°	50°32.0'	-50.1'	145.0°	13
14	54°31.6'	-47.1'	141.2°	53°44.6'	-47.7'	142.1°	52°57.0'	-48.3'	142.9°	52°08.9'	-48.9'	143.7°	51°20.3'	-49.5'	144.4°	50°31.3'	-50.0'	145.1°	49°41.9'	-50.5'	145.8°	14
15	53°44.6'	-47.6'	142.3°	52°56.9'	-48.2'	143.1°	52°08.6'	-48.8'	143.9°	51°20.0'	-49.4'	144.6°	50°30.8'	-49.9'	145.3°	49°41.3'	-50.4'	146.0°	48°51.4'	-50.9'	146.6°	15
16	52°57.0'	-48.1'	143.3°	52°08.6'	-48.7'	144.1°	51°19.8'	-49.2'	144.8°	50°30.6'	-49.8'	145.5°	49°40.9'	-50.3'	146.2°	48°50.9'	-50.7'	146.8°	48°00.5'	-51.2'	147.4°	16
17	52°08.9'	-48.6'	144.3°	51°20.0'	-49.1'	145.0°	50°30.6'	-49.7'	145.7°	49°40.8'	-50.2'	146.4°	48°50.7'	-50.6'	147.0°	48°00.2'	-51.1'	147.6°	47°09.3'	-51.5'	148.2°	17
18	51°20.3'	-49.0'	145.2°	50°30.8'	-49.5'	145.9°	49°40.9'	-50.0'	146.6°	48°50.7'	-50.5'	147.2°	48°00.0'	-50.9'	147.8°	47°09.1'	-51.4'	148.4°	46°17.8'	-51.8'	149.0°	18
19	50°31.3'	-49.4'	146.1°	49°41.3'	-49.9'	146.8°	48°50.9'	-50.4'	147.4°	48°00.2'	-50.8'	148.0°	47°09.1'	-51.3'	148.6°	46°17.7'	-51.7'	149.2°	45°26.1'	-52.0'	149.7°	19
20	49°41.9'	-49.8'	147.0°	48°51.4'	-50.3'	147.7°	48°00.5'	-50.7'	148.3°	47°09.3'	-51.2'	148.8°	46°17.8'	-51.6'	149.4°	45°26.1'	-51.9'	149.9°	44°34.0'	-52.3'	150.4°	20
21	48°52.1'	-50.2'	147.9°	48°01.1'	-50.6'	148.5°	47°09.8'	-51.0'	149.0°	46°18.2'	-51.4'	149.6°	45°26.3'	-51.8'	150.1°	44°34.1'	-52.2'	150.6°	43°41.7'	-52.5'	151.1°	21
22	48°01.9'	-50.5'	148.7°	47°10.4'	-51.0'	149.3°	46°18.7'	-51.3'	149.8°	45°26.7'	-51.7'	150.3°	44°34.5'	-52.1'	150.8°	43°42.0'	-52.4'	151.3°	42°49.2'	-52.7'	151.7°	22
23	47°11.3'	-50.9'	149.5°	46°19.5'	-51.3'	150.0°	45°27.4'	-51.6'	150.6°	44°35.0'	-52.0'	151.0°	43°42.4'	-52.3'	151.5°	42°49.5'	-52.7'	152.0°	41°56.5'	-53.0'	152.4°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

22° 338° LHA

Latitude CONTRARY to DECLINATION

22° 338° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

21° 339° LHA

Latitude CONTRARY to Declination

21° 339° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	64°56.2'	-35.0'	122.2°	64°23.5'	-36.6'	124.0°	63°49.2'	-38.1'	125.7°	63°13.5'	-39.5'	127.3°	62°36.5'	-40.8'	128.8°	61°58.3'	-42.1'	130.3°	61°18.9'	-43.2'	131.7°	0
1	64°21.2'	-36.4'	124.1°	63°46.9'	-37.9'	125.8°	63°11.1'	-39.3'	127.4°	62°34.0'	-40.6'	128.9°	61°55.7'	-41.9'	130.4°	61°16.2'	-43.0'	131.8°	60°35.7'	-44.1'	133.1°	1
2	63°44.8'	-37.7'	125.9°	63°09.0'	-39.1'	127.5°	62°31.8'	-40.5'	129.1°	61°53.4'	-41.7'	130.5°	61°13.8'	-42.8'	131.9°	60°33.2'	-43.9'	133.2°	59°51.6'	-44.9'	134.5°	2
3	63°07.1'	-38.9'	127.7°	62°29.8'	-40.3'	129.2°	61°51.3'	-41.5'	130.7°	61°11.7'	-42.6'	132.0°	60°31.0'	-43.7'	133.4°	59°49.3'	-44.7'	134.6°	59°06.7'	-45.7'	135.8°	3
4	62°28.2'	-40.1'	129.3°	61°49.6'	-41.3'	130.8°	61°09.8'	-42.5'	132.2°	60°27.4'	-43.4'	133.6°	59°45.5'	-44.4'	134.9°	59°02.7'	-45.3'	136.0°	58°19.1'	-46.2'	137.2°	4
5	61°48.1'	-41.1'	130.9°	61°08.2'	-42.3'	132.3°	60°27.4'	-43.4'	133.6°	59°44.0'	-44.2'	135.0°	59°01.1'	-45.1'	136.2°	58°17.4'	-46.0'	137.3°	57°32.9'	-46.8'	138.4°	5
6	61°07.0'	-42.1'	132.5°	60°26.0'	-43.2'	133.8°	59°44.0'	-44.2'	135.0°	59°01.1'	-45.1'	136.2°	58°17.4'	-46.0'	137.3°	57°31.4'	-46.7'	138.5°	56°46.1'	-47.5'	139.5°	6
7	60°24.8'	-43.0'	133.9°	59°42.8'	-44.0'	135.1°	58°59.8'	-45.0'	136.3°	58°16.0'	-45.9'	137.4°	57°31.4'	-46.7'	138.5°	56°46.1'	-47.5'	139.5°	56°00.1'	-48.2'	140.5°	7
8	59°41.8'	-43.9'	135.3°	58°58.7'	-44.8'	136.5°	58°14.8'	-45.7'	137.6°	57°30.1'	-46.5'	138.7°	56°44.7'	-47.3'	139.7°	55°58.6'	-48.0'	140.6°	55°12.0'	-48.7'	141.6°	8
9	58°57.9'	-44.7'	136.6°	58°13.9'	-45.6'	137.8°	57°29.1'	-46.4'	138.8°	56°43.6'	-47.2'	139.8°	55°57.4'	-47.9'	140.8°	55°10.6'	-48.6'	141.7°	54°23.3'	-49.2'	142.6°	9
10	58°13.2'	-45.4'	137.9°	57°28.3'	-46.2'	139.0°	56°42.7'	-47.0'	140.0°	55°56.4'	-47.7'	140.9°	55°09.5'	-48.4'	141.8°	54°22.1'	-49.0'	142.7°	53°34.1'	-49.6'	143.5°	10
11	57°27.8'	-46.1'	139.2°	56°42.1'	-46.9'	140.2°	55°55.7'	-47.6'	141.1°	55°08.7'	-48.3'	142.0°	54°21.1'	-48.9'	142.9°	53°33.0'	-49.5'	143.7°	52°44.4'	-50.1'	144.5°	11
12	56°41.7'	-46.7'	140.3°	55°55.2'	-47.5'	141.3°	55°08.1'	-48.1'	142.2°	54°20.4'	-48.8'	143.0°	53°32.2'	-49.4'	143.9°	52°43.5'	-49.9'	144.6°	51°54.4'	-50.5'	145.4°	12
13	55°54.9'	-47.3'	141.5°	55°07.7'	-48.0'	142.4°	54°19.9'	-48.7'	143.2°	53°31.6'	-49.3'	144.0°	52°42.8'	-49.8'	144.8°	51°53.6'	-50.3'	145.5°	51°03.9'	-50.8'	146.2°	13
14	55°07.6'	-47.9'	142.5°	54°19.7'	-48.5'	143.4°	53°31.3'	-49.1'	144.2°	52°42.4'	-49.7'	145.0°	51°53.0'	-50.2'	145.7°	51°03.2'	-50.7'	146.4°	50°13.0'	-51.2'	147.1°	14
15	54°19.7'	-48.4'	143.6°	53°31.1'	-49.0'	144.4°	52°42.1'	-49.6'	145.2°	51°52.7'	-50.1'	145.9°	51°02.8'	-50.6'	146.6°	50°12.5'	-51.1'	147.3°	49°21.9'	-51.5'	147.9°	15
16	53°31.3'	-48.9'	144.6°	52°42.1'	-49.5'	145.4°	51°52.6'	-50.0'	146.1°	51°02.6'	-50.5'	146.8°	50°12.2'	-51.0'	147.4°	49°21.4'	-51.4'	148.1°	48°30.3'	-51.8'	148.7°	16
17	52°42.4'	-49.4'	145.6°	51°52.7'	-49.9'	146.3°	51°02.6'	-50.4'	147.0°	50°12.1'	-50.9'	147.6°	49°21.2'	-51.3'	148.3°	48°30.0'	-51.7'	148.9°	47°38.5'	-52.1'	149.4°	17
18	51°53.0'	-49.8'	146.5°	51°02.8'	-50.3'	147.2°	50°12.2'	-50.7'	147.8°	49°21.2'	-51.2'	148.5°	48°29.9'	-51.6'	149.0°	47°38.3'	-52.0'	149.6°	46°46.4'	-52.4'	150.2°	18
19	51°03.2'	-50.2'	147.4°	50°12.5'	-50.6'	148.0°	49°21.4'	-51.1'	148.7°	48°30.0'	-51.5'	149.2°	47°38.3'	-51.9'	149.8°	46°46.3'	-52.3'	150.3°	45°54.0'	-52.6'	150.9°	19
20	50°13.0'	-50.5'	148.2°	49°21.9'	-51.0'	148.9°	48°30.3'	-51.4'	149.5°	47°38.5'	-51.8'	150.0°	46°46.4'	-52.2'	150.5°							

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

20° 340° LHA

Latitude CONTRARY to Declination

20° 340° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	65°45.1'	-36.1'	123.6°	65°11.1'	-37.7'	125.4°	64°35.6'	-39.2'	127.1°	63°58.7'	-40.6'	128.8°	63°20.5'	-41.9'	130.3°	62°41.1'	-43.1'	131.8°	62°00.5'	-44.2'	133.2°	0
1	65°09.0'	-37.5'	125.5°	64°33.5'	-39.0'	127.2°	63°56.5'	-40.4'	128.9°	63°18.2'	-41.7'	130.4°	62°38.7'	-42.9'	131.9°	61°58.0'	-44.0'	133.3°	61°16.4'	-45.0'	134.6°	1
2	64°31.5'	-38.8'	127.4°	63°54.5'	-40.2'	129.0°	63°16.1'	-41.5'	130.5°	62°36.5'	-42.7'	132.0°	61°55.8'	-43.8'	133.4°	61°14.0'	-44.9'	134.7°	60°31.3'	-45.8'	136.0°	2
3	63°52.8'	-40.0'	129.1°	63°14.3'	-41.3'	130.7°	62°34.6'	-42.5'	132.1°	61°53.8'	-43.6'	133.5°	61°12.0'	-44.7'	134.8°	60°29.2'	-45.7'	136.1°	59°45.5'	-46.6'	137.3°	3
4	63°12.7'	-41.1'	130.8°	62°33.0'	-42.4'	132.3°	61°52.1'	-43.5'	133.6°	61°10.2'	-44.5'	135.0°	60°27.3'	-45.5'	136.2°	59°43.5'	-46.4'	137.4°	58°59.0'	-47.2'	138.5°	4
5	62°31.6'	-42.2'	132.4°	61°50.6'	-43.3'	133.8°	61°08.6'	-44.4'	135.1°	60°25.6'	-45.3'	136.3°	59°41.8'	-46.2'	137.5°	58°57.2'	-47.1'	138.7°	58°11.7'	-47.9'	139.7°	5
6	61°49.4'	-43.2'	133.9°	61°07.3'	-44.2'	135.2°	60°24.2'	-45.2'	136.5°	59°40.3'	-46.1'	137.7°	58°55.6'	-46.9'	138.8°	58°10.1'	-47.7'	139.8°	57°23.9'	-48.4'	140.9°	6
7	61°06.3'	-44.0'	135.4°	60°23.1'	-45.0'	136.6°	59°39.1'	-45.9'	137.8°	58°54.2'	-46.8'	138.9°	58°08.7'	-47.6'	140.0°	57°22.4'	-48.3'	141.0°	56°35.4'	-49.0'	141.9°	7
8	60°22.2'	-44.9'	136.8°	59°38.1'	-45.8'	137.9°	58°53.1'	-46.6'	139.0°	58°07.5'	-47.4'	140.1°	57°21.1'	-48.2'	141.1°	56°34.1'	-48.8'	142.1°	55°46.5'	-49.5'	143.0°	8
9	59°37.3'	-45.6'	138.1°	58°52.3'	-46.5'	139.2°	58°06.5'	-47.3'	140.3°	57°20.0'	-48.0'	141.3°	56°32.9'	-48.7'	142.2°	55°45.2'	-49.4'	143.1°	54°57.0'	-50.0'	144.0°	9
10	58°51.7'	-46.4'	139.4°	58°05.8'	-47.2'	140.4°	57°19.2'	-47.9'	141.4°	56°32.0'	-48.6'	142.4°	55°44.2'	-49.2'	143.3°	54°55.9'	-49.8'	144.1°	54°07.0'	-50.4'	144.9°	10
11	58°05.3'	-47.0'	140.6°	57°18.6'	-47.8'	141.6°	56°31.3'	-48.5'	142.5°	55°43.4'	-49.1'	143.4°	54°55.0'	-49.7'	144.3°	54°06.1'	-50.3'	145.1°	53°16.6'	-50.8'	145.8°	11
12	57°18.3'	-47.6'	141.7°	56°30.9'	-48.3'	142.7°	55°42.9'	-49.0'	143.6°	54°54.3'	-49.6'	144.4°	54°05.3'	-50.1'	145.2°	53°15.8'	-50.7'	146.0°	52°25.8'	-51.2'	146.7°	12
13	56°30.7'	-48.2'	142.8°	55°42.5'	-48.9'	143.7°	54°53.9'	-49.5'	144.6°	54°04.8'	-50.0'	145.4°	53°15.2'	-50.6'	146.2°	52°25.1'	-51.1'	146.9°	51°34.7'	-51.5'	147.6°	13
14	55°42.4'	-48.7'	143.9°	54°53.7'	-49.4'	144.8°	54°04.4'	-49.9'	145.6°	53°14.7'	-50.4'	146.3°	52°24.6'	-50.9'	147.0°	51°34.1'	-51.4'	147.7°	50°43.1'	-51.9'	148.4°	14
15	54°53.7'	-49.2'	144.9°	54°04.3'	-49.8'	145.7°	53°14.5'	-50.3'	146.5°	52°24.3'	-50.8'	147.2°	51°33.7'	-51.3'	147.9°	50°42.6'	-51.7'	148.6°	49°51.3'	-52.2'	149.2°	15
16	54°04.4'	-49.7'	145.9°	53°14.5'	-50.2'	146.7°	52°24.2'	-50.7'	147.4°	51°33.4'	-51.2'	148.1°	50°42.3'	-51.6'	148.7°	49°50.9'	-52.1'	149.3°	48°59.1'	-52.5'	149.9°	16
17	53°14.7'	-50.1'	146.9°	52°24.3'	-50.6'	147.6°	51°33.4'	-51.1'	148.3°	50°42.2'	-51.5'	148.9°	49°50.7'	-51.9'	149.7°	48°58.8'	-52.4'	150.1°	48°06.7'	-52.7'	150.7°	17
18	52°24.6'	-50.5'	147.8°	51°33.7'	-51.0'	148.5°	50°42.3'	-51.5'	149.1°	49°50.7'	-51.9'	149.7°	48°58.7'	-52.3'	150.3°	48°06.5'	-52.6'	150.8°	47°13.9'	-53.0'	151.4°	18
19	51°34.1'	-50.9'	148.7°	50°42.6'	-51.4'	149.3°	49°50.9'	-51.8'	149.9°	48°58.8'	-52.2'	150.5°	48°06.5'	-52.5'	151.0°	47°13.9'	-52.9'	151.6°	46°21.0'	-53.2'	152.1°	19
20	50°43.1'	-51.3'	149.5°	49°51.3'	-51.7'	150.1°	48°59.1'	-52.1'	150.7°	48°06.7'	-52.4'	151.2°	47°13.9'	-52.8'	151.8°	46°21.0'	-53.1'	152.3°	45°27.8'	-53.4'	152.7°	20
21	49°51.9'	-51.6'	150.3°	48°59.6'	-52.0'	150.9°	48°07.0'	-52.4'	151.4°	47°14.2'	-52.7'	151.9°	46°21.1'	-53.0'	152.4°	45°27.8'	-53.4'	152.9°	44°34.7'	-53.6'	153.4°	21
22	49°00.3'	-51.9'	151.1°	48°07.6'	-52.3'	151.6°	47°14.7'	-52.6'	152.2°	46°21.5'	-53.0'	152.6°	45°28.1'	-53.3'	153.1°	44°34.5'	-53.6'	153.6°	43°40.7'	-53.8'	154.0°	22
23	48°08.4'	-52.2'	151.8°	47°15.3'	-52.5'	152.4°	46°22.1'	-52.9'	152.9°	45°28.6'	-53.2'	153.3°	44°34.8'	-53.5'	153.8°	43°40.9'	-53.8'	154.2°	42°46.8'	-54.0'	154.6°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

20° 340° LHA

Latitude CONTRARY to DECLINATION

20° 340° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

19° 341° LHA

Latitude CONTRARY to Declination

19° 341° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	66°33.2'	-37.2'	125.1°	65°57.9'	-38.8'	126.9°	65°21.2'	-40.3'	128.7°	64°43.0'	-41.6'	130.3°	64°03.5'	-42.9'	131.9°	63°22.9'	-44.1'	133.4°	62°41.1'	-45.2'	134.8°	0
1	65°55.9'	-38.6'	127.0°	65°19.1'	-40.1'	128.8°	64°40.9'	-41.5'	130.4°	64°01.3'	-42.7'	132.0°	63°20.6'	-43.9'	133.5°	62°38.8'	-45.0'	134.9°	61°55.9'	-46.0'	136.2°	1
2	65°17.3'	-39.9'	128.9°	64°39.0'	-41.3'	130.5°	63°59.4'	-42.6'	132.1°	63°18.6'	-43.7'	133.6°	62°36.7'	-44.8'	135.0°	61°53.8'	-45.8'	136.3°	61°10.0'	-46.8'	137.6°	2
3	64°37.4'	-41.1'	130.7°	63°57.7'	-42.4'	132.2°	63°16.8'	-43.6'	133.7°	62°34.9'	-44.7'	135.1°	61°51.9'	-45.7'	136.4°	61°08.0'	-46.6'	137.7°	60°23.2'	-47.5'	138.9°	3
4	63°56.3'	-42.2'	132.3°	63°15.3'	-43.4'	133.8°	62°33.3'	-44.5'	135.2°	61°50.2'	-45.5'	136.5°	61°06.2'	-46.4'	137.8°	60°21.4'	-47.3'	139.0°	59°35.7'	-48.1'	140.1°	4
5	63°14.1'	-43.3'	133.9°	62°31.9'	-44.3'	135.3°	61°48.8'	-45.4'	136.6°	61°04.7'	-46.3'	137.9°	60°19.8'	-47.2'	139.1°	59°34.1'	-48.0'	140.2°	58°47.6'	-48.7'	141.2°	5
6	62°30.8'	-44.2'	135.5°	61°47.6'	-45.2'	136.8°	61°03.4'	-46.2'	138.0°	60°18.4'	-47.0'	139.2°	59°32.6'	-47.8'	140.3°	58°46.1'	-48.6'	141.4°	57°58.9'	-49.3'	142.4°	6
7	61°46.6'	-45.1'	136.9°	61°02.4'	-46.0'	138.1°	60°17.3'	-46.9'	139.3°	59°31.4'	-47.7'	140.4°	58°44.8'	-48.4'	141.5°	57°57.5'	-49.1'	142.5°	57°09.6'	-49.8'	143.4°	7
8	61°01.5'	-45.9'	138.3°	60°16.3'	-46.8'	139.4°	59°30.4'	-47.6'	140.6°	58°43.7'	-48.3'	141.6°	57°56.3'	-49.0'	142.6°	57°08.4'	-49.7'	143.5°	56°19.8'	-50.3'	144.4°	8
9	60°15.6'	-46.6'	139.6°	59°29.6'	-47.4'	140.7°	58°42.8'	-48.2'	141.7°	57°55.4'	-48.9'	142.7°	57°07.3'	-49.5'	143.7°	56°18.7'	-50.1'	144.6°	55°29.6'	-50.7'	145.4°	9
10	59°29.0'	-47.3'	140.8°	58°42.2'	-48.1'	141.9°	57°54.6'	-48.8'	142.9°	57°06.5'	-49.4'	143.8°	56°17.8'	-50.0'	144.7°	55°28.6'	-50.6'	145.5°	54°38.8'	-51.1'	146.3°	10
11	58°41.7'	-47.9'	142.0°	57°54.1'	-48.6'	143.0°	57°05.9'	-49.3'	144.0°	56°17.1'	-49.9'	144.8°	55°27.8'	-50.5'	145.7°	54°38.0'	-51.0'	146.5°	53°47.7'	-51.5'	147.2°	11
12	57°53.8'	-48.5'	143.2°	57°05.4'	-49.2'	144.1°	56°16.6'	-49.8'	145.0°	55°27.2'	-50.4'	145.8°	54°37.3'	-50.9'	146.6°	53°46.9'	-51.4'	147.4°	52°56.2'	-51.9'	148.1°	12
13	57°05.2'	-49.1'	144.3°	56°16.2'	-49.7'	145.2°	55°26.8'	-50.3'	146.0°	54°36.8'	-50.8'	146.8°	53°46.4'	-51.3'	147.5°	52°55.5'	-51.8'	148.3°	52°04.3'	-52.2'	148.9°	13
14	56°16.1'	-49.6'	145.3°	55°26.6'	-50.2'	146.2°	54°36.5'	-50.7'	146.9°	53°46.0'	-51.2'	147.7°	52°55.1'	-51.7'	148.4°	52°03.8'	-52.1'	149.1°	51°12.1'	-52.5'	149.7°	14
15	55°26.6'	-50.1'	146.3°	54°36.4'	-50.6'	147.1°	53°45.8'	-51.1'	147.9°	52°54.8'	-51.6'	148.6°	52°03.4'	-52.0'	149.2°	51°11.7'	-52.4'	149.9°	50°19.6'	-52.8'	150.5°	15
16	54°36.5'	-50.5'	147.3°	53°45.8'	-51.0'	148.0°	52°54.7'	-51.5'	148.7°	52°03.2'	-51.9'	149.4°	51°11.4'	-52.3'	150.0°	50°19.3'	-52.7'	150.6°	49°26.8'	-53.1'	151.2°	16
17	53°46.0'	-50.9'	148.2°	52°54.8'	-51.4'	148.9°	52°03.2'	-51.8'	149.6°	51°11.3'	-52.2'	150.2°	50°19.1'	-52.6'	150.8°	49°26.6'	-53.0'	151.4°	48°33.7'	-53.3'	151.9°	17
18	52°55.1'	-51.3'	149.1°	52°03.4'	-51.7'	149.8°	51°11.4'	-52.1'	150.4°	50°19.1'	-52.5'	151.0°	49°26.5'	-52.9'	151.6°	48°33.6'	-53.2'	152.1°	47°40.4'	-53.6'	152.6°	18
19	52°03.8'	-51.6'	150.0°	51°11.7'	-52.1'	150.6°	50°19.3'	-52.4'	151.2°	49°26.6'	-52.8'	151.7°	48°33.6'	-53.2'	152.3°	47°40.3'	-53.5'	152.8°	46°46.8'	-53.8'	153.3°	19
20	51°12.1'	-52.0'	150.8°	50°19.6'	-52.4'	151.4°	49°26.8'	-52.7'	151.9°	48°33.7'	-53.1'	152.5°	47°40.4'	-53.4'								

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

18° 342° LHA

Latitude CONTRARY to Declination

18° 342° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	67°20.3'	-38.4'	126.7°	66°43.8'	-40.0'	128.5°	66°05.7'	-41.4'	130.3°	65°26.2'	-42.8'	132.0°	64°45.4'	-44.0'	133.6°	64°03.5'	-45.1'	135.1°	63°20.5'	-46.2'	136.5°	0
1	66°41.9'	-39.8'	128.6°	66°03.8'	-41.3'	130.4°	65°24.2'	-42.6'	132.1°	64°43.4'	-43.8'	133.6°	64°01.4'	-45.0'	135.1°	63°18.4'	-46.0'	136.5°	62°34.4'	-47.0'	137.9°	1
2	66°02.1'	-41.1'	130.5°	65°22.5'	-42.4'	132.2°	64°41.6'	-43.7'	133.7°	63°59.6'	-44.8'	135.2°	63°16.5'	-45.8'	136.6°	62°32.4'	-46.8'	138.0°	61°47.4'	-47.7'	139.2°	2
3	65°21.1'	-42.3'	132.3°	64°40.1'	-43.5'	133.8°	63°58.0'	-44.6'	135.3°	63°14.8'	-45.7'	136.7°	62°30.6'	-46.7'	138.0°	61°45.6'	-47.6'	139.3°	60°59.7'	-48.4'	140.5°	3
4	64°38.8'	-43.4'	134.0°	63°56.6'	-44.5'	135.4°	63°13.3'	-45.6'	136.8°	62°29.1'	-46.5'	138.1°	61°44.0'	-47.4'	139.4°	60°58.0'	-48.2'	140.6°	60°11.3'	-49.0'	141.7°	4
5	63°55.4'	-44.4'	135.5°	63°12.1'	-45.4'	136.9°	62°27.8'	-46.4'	138.3°	61°42.6'	-47.3'	139.5°	60°56.6'	-48.1'	140.7°	60°09.8'	-48.9'	141.8°	59°22.3'	-49.6'	142.8°	5
6	63°11.1'	-45.3'	137.1°	62°26.7'	-46.2'	138.4°	61°41.4'	-47.1'	139.6°	60°55.3'	-48.0'	140.8°	60°08.5'	-48.7'	141.9°	59°20.9'	-49.5'	142.9°	58°32.7'	-50.1'	143.9°	6
7	62°25.8'	-46.1'	138.5°	61°40.4'	-47.0'	139.7°	60°54.3'	-47.8'	140.9°	60°07.3'	-48.6'	142.0°	59°19.7'	-49.3'	143.0°	58°31.5'	-50.0'	144.0°	57°42.6'	-50.6'	145.0°	7
8	61°39.7'	-46.9'	139.9°	60°53.4'	-47.7'	141.0°	60°06.4'	-48.5'	142.1°	59°18.7'	-49.2'	143.2°	58°30.4'	-49.9'	144.1°	57°41.5'	-50.5'	145.1°	56°52.0'	-51.1'	146.0°	8
9	60°52.8'	-47.6'	141.2°	60°05.7'	-48.4'	142.3°	59°17.9'	-49.1'	143.3°	58°29.5'	-49.8'	144.3°	57°40.5'	-50.4'	145.2°	56°51.0'	-50.9'	146.1°	56°01.0'	-51.5'	146.9°	9
10	60°05.2'	-48.3'	142.4°	59°17.3'	-49.0'	143.4°	58°28.8'	-49.6'	144.4°	57°39.8'	-50.3'	145.3°	56°50.2'	-50.8'	146.2°	56°00.1'	-51.4'	147.0°	55°09.5'	-51.9'	147.8°	10
11	59°16.9'	-48.9'	143.6°	58°28.3'	-49.5'	144.5°	57°39.2'	-50.2'	145.5°	56°49.5'	-50.7'	146.3°	55°59.3'	-51.3'	147.2°	55°08.7'	-51.8'	147.9°	54°17.6'	-52.2'	148.7°	11
12	58°28.0'	-49.4'	144.7°	57°38.8'	-50.1'	145.6°	56°49.0'	-50.6'	146.5°	55°58.8'	-51.2'	147.3°	55°08.1'	-51.7'	148.1°	54°16.9'	-52.1'	148.8°	53°25.4'	-52.6'	149.5°	12
13	57°38.6'	-50.0'	145.8°	56°48.7'	-50.5'	146.6°	55°58.4'	-51.1'	147.4°	55°07.6'	-51.6'	148.2°	54°16.4'	-52.0'	149.0°	53°24.8'	-52.5'	149.7°	52°32.8'	-52.9'	150.3°	13
14	56°48.7'	-50.4'	146.8°	55°58.2'	-51.0'	147.6°	55°07.3'	-51.5'	148.4°	54°16.1'	-51.9'	149.1°	53°24.4'	-52.4'	149.8°	52°32.3'	-52.8'	150.5°	51°40.0'	-53.2'	151.1°	14
15	55°58.2'	-50.9'	147.8°	55°07.3'	-51.4'	148.5°	54°15.9'	-51.8'	149.3°	53°24.1'	-52.3'	150.0°	52°32.0'	-52.7'	150.6°	51°39.6'	-53.1'	151.2°	50°46.8'	-53.4'	151.8°	15
16	55°07.3'	-51.3'	148.7°	54°15.9'	-51.8'	149.4°	53°24.0'	-52.2'	150.1°	52°31.8'	-52.6'	150.8°	51°39.3'	-53.0'	151.4°	50°46.5'	-53.3'	152.0°	49°53.4'	-53.7'	152.5°	16
17	54°16.1'	-51.7'	149.6°	53°24.1'	-52.1'	150.3°	52°31.8'	-52.5'	150.9°	51°39.2'	-52.9'	151.6°	50°46.3'	-53.3'	152.1°	49°53.1'	-53.6'	152.7°	48°59.7'	-53.9'	153.2°	17
18	53°24.4'	-52.0'	150.5°	52°32.0'	-52.4'	151.1°	51°39.3'	-52.8'	151.7°	50°46.3'	-53.2'	152.3°	49°53.1'	-53.5'	152.9°	48°59.5'	-53.8'	153.4°	48°05.8'	-54.1'	153.9°	18
19	52°32.3'	-52.4'	151.3°	51°39.6'	-52.7'	151.9°	50°46.5'	-53.1'	152.5°	49°53.1'	-53.4'	153.0°	48°59.5'	-53.8'	153.6°	48°05.7'	-54.1'	154.1°	47°11.6'	-54.3'	154.5°	19
20	51°40.0'	-52.7'	152.1°	50°46.8'	-53.0'	152.7°	49°53.4'	-53.4'	153.2°	48°59.7'	-53.7'	153.7°	48°05.8'	-54.0'	154.2°	47°11.6'	-54.3'	154.7°	46°17.3'	-54.5'	155.2°	20
21	50°47.3'	-53.0'	152.8°	49°53.8'	-53.3'	153.4°	49°00.0'	-53.6'	153.9°	48°06.0'	-53.9'	154.4°	47°11.8'	-54.2'	154.9°	46°17.4'	-54.5'	155.3°	45°22.8'	-54.7'	155.8°	21
22	49°54.3'	-53.2'	153.6°	49°00.5'	-53.6'	154.1°	48°06.4'	-53.8'	154.6°	47°12.1'	-54.1'	155.1°	46°17.6'	-54.4'	155.5°	45°22.9'	-54.7'	155.9°	44°28.0'	-54.9'	156.3°	22
23	49°01.1'	-53.5'	154.3°	48°06.9'	-53.8'	154.8°	47°12.5'	-54.1'	155.2°	46°18.0'	-54.3'	155.7°	45°23.2'	-54.6'	156.1°	44°28.3'	-54.8'	156.5°	43°33.1'	-55.1'	156.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

18° 342° LHA

Latitude CONTRARY to DECLINATION

18° 342° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

17° 343° LHA

Latitude CONTRARY to Declination

17° 343° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	68°06.5'	-39.7'	128.4°	67°28.6'	-41.2'	130.2°	66°49.1'	-42.6'	132.0°	66°08.2'	-43.9'	133.7°	65°26.2'	-45.1'	135.3°	64°43.0'	-46.2'	136.8°	63°58.7'	-47.2'	138.2°	0
1	67°26.9'	-41.0'	130.3°	66°47.4'	-42.5'	132.1°	66°06.5'	-43.8'	133.8°	65°24.3'	-44.9'	135.4°	64°41.1'	-46.0'	136.9°	63°56.8'	-47.0'	138.3°	63°11.5'	-48.0'	139.6°	1
2	66°45.8'	-42.3'	132.2°	66°04.9'	-43.6'	133.9°	65°22.7'	-44.8'	135.5°	64°39.4'	-45.9'	137.0°	63°55.0'	-46.9'	138.3°	63°09.8'	-47.8'	139.7°	62°23.6'	-48.7'	140.9°	2
3	66°03.6'	-43.5'	134.0°	65°21.3'	-44.7'	135.6°	64°37.9'	-45.7'	137.0°	63°53.5'	-46.8'	138.4°	63°08.2'	-47.7'	139.7°	62°21.9'	-48.5'	141.0°	61°34.9'	-49.3'	142.2°	3
4	65°20.1'	-44.5'	135.7°	64°36.6'	-45.6'	137.1°	63°52.2'	-46.6'	138.5°	63°06.8'	-47.5'	139.8°	62°20.5'	-48.4'	141.1°	61°33.4'	-49.2'	142.2°	60°45.6'	-49.9'	143.3°	4
5	64°35.6'	-45.5'	137.2°	63°51.0'	-46.5'	138.6°	63°05.5'	-47.4'	139.9°	62°19.2'	-48.3'	141.2°	61°32.1'	-49.1'	142.3°	60°44.2'	-49.8'	143.4°	59°55.7'	-50.4'	144.5°	5
6	63°50.1'	-46.4'	138.7°	63°04.5'	-47.3'	140.0°	62°18.1'	-48.1'	141.3°	61°30.9'	-48.9'	142.4°	60°43.0'	-49.7'	143.5°	59°54.5'	-50.3'	144.6°	59°05.3'	-50.9'	145.5°	6
7	63°03.7'	-47.2'	140.2°	62°17.2'	-48.0'	141.4°	61°30.0'	-48.8'	142.5°	60°42.0'	-49.5'	143.6°	59°53.4'	-50.2'	144.7°	59°04.1'	-50.8'	145.6°	58°14.3'	-51.4'	146.5°	7
8	62°16.6'	-47.9'	141.5°	61°29.2'	-48.7'	142.7°	60°41.2'	-49.4'	143.7°	59°52.5'	-50.1'	144.8°	59°03.2'	-50.7'	145.7°	58°13.3'	-51.3'	146.6°	57°22.9'	-51.8'	147.5°	8
9	61°28.6'	-48.6'	142.8°	60°40.5'	-49.3'	143.9°	59°51.7'	-50.0'	144.9°	59°02.4'	-50.6'	145.9°	58°12.4'	-51.2'	146.8°	57°22.0'	-51.7'	147.6°	56°31.1'	-52.2'	148.4°	9
10	60°40.1'	-49.2'	144.0°	59°51.2'	-49.9'	145.0°	59°01.8'	-50.5'	146.0°	58°11.8'	-51.1'	146.9°	57°21.3'	-51.6'	147.7°	56°30.3'	-52.1'	148.6°	55°38.9'	-52.6'	149.3°	10
11	59°50.8'	-49.8'	145.2°	59°01.3'	-50.4'	146.1°	58°11.2'	-51.0'	147.0°	57°20.7'	-51.5'	147.9°	56°29.6'	-52.0'	148.7°	55°38.2'	-52.5'	149.4°	54°46.3'	-52.9'	150.2°	11
12	59°01.0'	-50.3'	146.3°	58°10.9'	-50.9'	147.2°	57°20.2'	-51.4'	148.0°	56°29.1'	-51.9'	148.8°	55°37.6'	-52.4'	149.6°	54°45.7'	-52.8'	150.3°	53°53.4'	-53.2'	151.0°	12
13	58°10.7'	-50.8'	147.3°	57°20.0'	-51.3'	148.1°	56°28.8'	-51.8'	148.9°	55°37.2'	-52.3'	149.7°	54°45.2'	-52.7'	150.4°	53°52.8'	-53.1'	151.1°	53°00.2'	-53.5'	151.7°	13
14	57°19.9'	-51.3'	148.3°	56°28.6'	-51.8'	149.1°	55°37.0'	-52.2'	149.8°	54°44.9'	-52.7'	150.6°	53°52.5'	-53.1'	151.2°	52°59.7'	-53.4'	151.9°	52°06.6'	-53.8'	152.5°	14
15	56°28.6'	-51.7'	149.2°	55°36.9'	-52.1'	150.0°	54°44.7'	-52.6'	150.7°	53°52.2'	-53.0'	151.4°	52°59.4'	-53.4'	152.0°	52°06.3'	-53.7'	152.6°	51°12.8'	-54.0'	153.2°	15
16	55°37.0'	-52.1'	150.2°	54°44.7'	-52.5'	150.9°	53°52.1'	-52.9'	151.5°	52°59.2'	-53.3'	152.2°	52°06.0'	-53.6'	152.8°	51°12.5'	-54.0'	153.3°	50°18.8'	-54.3'	153.9°	16
17	54°44.9'	-52.4'	151.0°	53°52.2'	-52.8'	151.7°	52°59.2'	-53.2'	152.3°	52°06.0'	-53.6'	152.9°	51°12.4'	-53.9'	153.5°	50°18.6'	-54.2'	154.0°	49°24.5'	-54.5'	154.6°	17
18	53°52.5'	-52.8'	151.9°	52°59.4'	-53.1'	152.5°	52°06.0'	-53.5'	153.1°	51°12.4'	-53.8'	153.7°	50°18.5'	-54.1'	154.2°	49°24.4'	-54.4'	154.7°	48°30.0'	-54.7'	155.2°	18
19	52°59.7'	-53.1'	152.7°	52°06.3'	-53.4'	153.3°	51°12.5'	-53.8'	153.8°	50°18.6'	-54.1'	154.4°	49°24.4'	-54.4'	154.9°	48°30.0'	-54.6'	155.3°	47°35.3'	-54.9'	155.8°	19
20	52°06.6'	-53.4'	153.4°	51°12.8'	-53.7'	154.0°	50°18.8'	-54.0'	154.5°	49°24.5'	-54.3'	155.0°	48°30.0'	-54.6'								

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

16° 344° LHA

Latitude CONTRARY to Declination

16° 344° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	68°51.6'	-41.0'	130.2°	68°12.2'	-42.5'	132.1°	67°31.3'	-43.8'	133.9°	66°49.1'	-45.1'	135.6°	66°05.7'	-46.2'	137.1°	65°21.2'	-47.3'	138.6°	64°35.6'	-48.2'	140.0°	0
1	68°10.6'	-42.3'	132.1°	67°29.7'	-43.7'	133.9°	66°47.5'	-44.9'	135.6°	66°04.0'	-46.1'	137.2°	65°19.4'	-47.1'	138.7°	64°33.9'	-48.1'	140.1°	63°47.4'	-49.0'	141.4°	1
2	67°28.3'	-43.6'	134.0°	66°46.0'	-44.8'	135.7°	66°02.5'	-46.0'	137.3°	65°17.9'	-47.0'	138.8°	64°32.3'	-48.0'	140.2°	63°45.8'	-48.8'	141.5°	62°58.5'	-49.6'	142.7°	2
3	66°44.8'	-44.7'	135.8°	66°01.2'	-45.8'	137.4°	65°16.6'	-46.9'	138.8°	64°30.9'	-47.8'	140.2°	63°44.3'	-48.7'	141.5°	62°57.0'	-49.5'	142.8°	62°08.8'	-50.2'	143.9°	3
4	66°00.1'	-45.7'	137.5°	65°15.4'	-46.7'	138.9°	64°29.7'	-47.7'	140.3°	63°43.1'	-48.6'	141.6°	62°55.6'	-49.4'	142.8°	62°07.5'	-50.1'	144.0°	61°18.6'	-50.8'	145.1°	4
5	65°14.4'	-46.6'	139.0°	64°28.7'	-47.6'	140.4°	63°42.0'	-48.5'	141.7°	62°54.5'	-49.3'	142.9°	62°06.3'	-50.0'	144.1°	61°17.4'	-50.7'	145.1°	60°27.8'	-51.3'	146.2°	5
6	64°27.8'	-47.5'	140.5°	63°41.1'	-48.3'	141.8°	62°53.5'	-49.1'	143.0°	62°05.2'	-49.9'	144.2°	61°16.3'	-50.6'	145.2°	60°26.7'	-51.2'	146.2°	59°36.5'	-51.8'	147.2°	6
7	63°40.3'	-48.2'	141.9°	62°52.7'	-49.0'	143.1°	62°04.4'	-49.8'	144.3°	61°15.4'	-50.5'	145.3°	60°25.7'	-51.1'	146.3°	59°35.5'	-51.7'	147.3°	58°44.8'	-52.2'	148.2°	7
8	62°52.1'	-48.9'	143.2°	62°03.7'	-49.7'	144.4°	61°14.6'	-50.4'	145.4°	60°24.9'	-51.0'	146.4°	59°34.6'	-51.6'	147.4°	58°43.8'	-52.1'	148.3°	57°52.6'	-52.6'	149.1°	8
9	62°03.2'	-49.6'	144.5°	61°14.0'	-50.3'	145.5°	60°24.2'	-50.9'	146.5°	59°33.9'	-51.5'	147.5°	58°43.1'	-52.0'	148.4°	57°51.7'	-52.5'	149.2°	56°60.0'	-53.0'	150.0°	9
10	61°13.6'	-50.2'	145.7°	60°23.7'	-50.8'	146.7°	59°33.3'	-51.4'	147.6°	58°42.4'	-51.9'	148.5°	57°51.0'	-52.4'	149.3°	56°59.2'	-52.9'	150.1°	56°07.0'	-53.3'	150.9°	10
11	60°23.4'	-50.7'	146.8°	59°32.9'	-51.3'	147.7°	58°42.0'	-51.8'	148.6°	57°50.5'	-52.3'	149.4°	56°58.6'	-52.8'	150.2°	56°06.4'	-53.2'	151.0°	55°13.7'	-53.6'	151.7°	11
12	59°32.7'	-51.2'	147.9°	58°41.6'	-51.7'	148.7°	57°50.1'	-52.2'	149.6°	56°58.2'	-52.7'	150.4°	56°05.9'	-53.1'	151.1°	55°13.1'	-53.5'	151.8°	54°20.1'	-53.9'	152.5°	12
13	58°41.5'	-51.7'	148.9°	57°49.9'	-52.2'	149.7°	56°57.9'	-52.6'	150.5°	56°05.5'	-53.0'	151.2°	55°12.7'	-53.4'	151.9°	54°19.6'	-53.8'	152.6°	53°26.2'	-54.2'	153.2°	13
14	57°49.8'	-52.1'	149.8°	56°57.7'	-52.5'	150.6°	56°05.3'	-53.0'	151.4°	55°12.4'	-53.4'	152.0°	54°19.3'	-53.7'	152.7°	53°25.8'	-54.1'	153.3°	52°32.1'	-54.4'	153.9°	14
15	56°57.7'	-52.5'	150.8°	56°05.2'	-52.9'	151.5°	55°12.3'	-53.3'	152.2°	54°19.1'	-53.7'	152.8°	53°25.5'	-54.0'	153.5°	52°31.7'	-54.3'	154.0°	51°37.6'	-54.6'	154.6°	15
16	56°05.3'	-52.8'	151.6°	55°12.3'	-53.2'	152.3°	54°19.0'	-53.6'	153.0°	53°25.4'	-53.9'	153.6°	52°31.5'	-54.3'	154.2°	51°37.4'	-54.6'	154.7°	50°43.0'	-54.9'	155.3°	16
17	55°12.4'	-53.2'	152.5°	54°19.1'	-53.5'	153.1°	53°25.4'	-53.9'	153.7°	52°31.5'	-54.2'	154.3°	51°37.3'	-54.5'	154.9°	50°42.8'	-54.8'	155.4°	49°48.1'	-55.1'	155.9°	17
18	54°19.3'	-53.5'	153.3°	53°25.5'	-53.8'	153.9°	52°31.5'	-54.1'	154.5°	51°37.3'	-54.4'	155.0°	50°42.7'	-54.7'	155.5°	49°48.0'	-55.0'	156.0°	48°53.1'	-55.2'	156.5°	18
19	53°25.8'	-53.8'	154.1°	52°31.7'	-54.1'	154.6°	51°37.4'	-54.4'	155.2°	50°42.8'	-54.7'	155.7°	49°48.0'	-54.9'	156.2°	48°53.0'	-55.2'	156.7°	47°57.9'	-55.4'	157.1°	19
20	52°32.1'	-54.0'	154.8°	51°37.6'	-54.3'	155.3°	50°43.0'	-54.6'	155.9°	49°48.1'	-54.9'	156.3°	48°53.1'	-55.1'	156.8°	47°57.9'	-55.4'	157.2°	47°02.4'	-55.6'	157.7°	20
21	51°38.0'	-54.3'	155.5°	50°43.3'	-54.5'	156.0°	49°48.4'	-54.8'	156.5°	48°53.3'	-55.1'	157.0°	47°58.0'	-55.3'	157.4°	47°02.5'	-55.5'	157.8°	46°06.9'	-55.7'	158.2°	21
22	50°43.8'	-54.5'	156.2°	49°48.8'	-54.8'	156.7°	48°53.6'	-55.0'	157.1°	47°58.2'	-55.2'	157.6°	47°02.7'	-55.5'	158.0°	46°07.0'	-55.7'	158.4°	45°11.1'	-55.9'	158.7°	22
23	49°49.3'	-54.7'	156.8°	48°54.0'	-55.0'	157.3°	47°58.6'	-55.2'	157.7°	47°03.0'	-55.4'	158.1°	46°07.2'	-55.6'	158.5°	45°11.3'	-55.8'	158.9°	44°15.3'	-56.0'	159.3°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

16° 344° LHA

Latitude CONTRARY to DECLINATION

16° 344° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

15° 345° LHA

Latitude CONTRARY to Declination

15° 345° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	69°35.5'	-42.3'	132.1°	68°54.6'	-43.8'	134.0°	68°12.2'	-45.1'	135.8°	67°28.6'	-46.3'	137.5°	66°43.8'	-47.4'	139.1°	65°57.9'	-48.4'	140.5°	65°11.1'	-49.3'	141.9°	0
1	68°53.1'	-43.7'	134.1°	68°10.8'	-45.0'	135.9°	67°27.1'	-46.2'	137.6°	66°42.3'	-47.3'	139.1°	65°56.4'	-48.2'	140.6°	65°09.6'	-49.1'	142.0°	64°21.9'	-50.0'	143.3°	1
2	68°09.5'	-44.8'	136.0°	67°25.8'	-46.0'	137.6°	66°40.9'	-47.1'	139.2°	65°55.0'	-48.1'	140.7°	65°08.1'	-49.0'	142.0°	64°20.4'	-49.8'	143.3°	63°31.9'	-50.6'	144.5°	2
3	67°24.7'	-45.9'	137.7°	66°39.8'	-47.0'	139.3°	65°53.8'	-48.0'	140.7°	65°06.9'	-48.9'	142.1°	64°19.1'	-49.7'	143.4°	63°30.6'	-50.5'	144.6°	62°41.3'	-51.2'	145.7°	3
4	66°38.8'	-46.9'	139.4°	65°52.7'	-47.9'	140.8°	65°05.8'	-48.8'	142.2°	64°18.0'	-49.6'	143.5°	63°29.4'	-50.4'	144.7°	62°40.1'	-51.0'	145.8°	61°50.2'	-51.7'	146.8°	4
5	65°51.9'	-47.8'	140.9°	65°04.9'	-48.7'	142.3°	64°17.0'	-49.5'	143.5°	63°28.4'	-50.3'	144.7°	62°39.0'	-50.9'	145.9°	61°49.1'	-51.6'	146.9°	60°58.5'	-52.1'	147.9°	5
6	65°04.1'	-48.6'	142.4°	64°16.2'	-49.4'	143.6°	63°27.5'	-50.2'	144.8°	62°38.1'	-50.8'	145.9°	61°48.1'	-51.5'	147.0°	60°57.5'	-52.1'	148.0°	60°06.4'	-52.6'	148.9°	6
7	64°15.5'	-49.3'	143.7°	63°26.8'	-50.1'	144.9°	62°37.3'	-50.7'	146.0°	61°47.3'	-51.4'	147.1°	60°56.6'	-52.0'	148.1°	60°05.4'	-52.5'	149.0°	59°13.8'	-53.0'	149.9°	7
8	63°26.2'	-50.0'	145.0°	62°36.7'	-50.7'	146.1°	61°46.6'	-51.3'	147.2°	60°55.9'	-51.9'	148.2°	60°04.7'	-52.4'	149.1°	59°13.0'	-52.9'	149.9°	58°20.8'	-53.3'	150.8°	8
9	62°36.3'	-50.6'	146.3°	61°46.1'	-51.2'	147.3°	60°55.3'	-51.8'	148.3°	60°04.0'	-52.3'	149.2°	59°12.3'	-52.8'	150.0°	58°20.1'	-53.3'	150.9°	57°27.5'	-53.7'	151.6°	9
10	61°45.7'	-51.1'	147.4°	60°54.9'	-51.7'	148.4°	60°03.5'	-52.2'	149.3°	59°11.7'	-52.7'	150.2°	58°19.5'	-53.2'	151.0°	57°26.8'	-53.6'	151.7°	56°33.8'	-54.0'	152.4°	10
11	60°54.6'	-51.6'	148.5°	60°03.2'	-52.2'	149.4°	59°11.3'	-52.6'	150.3°	58°19.0'	-53.1'	151.1°	57°26.3'	-53.5'	151.8°	56°33.2'	-53.9'	152.6°	55°39.8'	-54.3'	153.2°	11
12	60°03.0'	-52.1'	149.5°	59°11.0'	-52.6'	150.4°	58°18.6'	-53.0'	151.2°	57°25.9'	-53.5'	151.9°	56°32.8'	-53.8'	152.7°	55°39.3'	-54.2'	153.3°	54°45.5'	-54.5'	154.0°	12
13	59°10.9'	-52.5'	150.5°	58°18.4'	-53.0'	151.3°	57°25.6'	-53.4'	152.1°	56°32.4'	-53.8'	152.8°	55°38.9'	-54.1'	153.5°	54°45.1'	-54.5'	154.1°	53°51.0'	-54.8'	154.7°	13
14	58°18.4'	-52.9'	151.4°	57°25.5'	-53.3'	152.2°	56°32.2'	-53.7'	152.9°	55°38.7'	-54.1'	153.6°	54°44.8'	-54.4'	154.2°	53°50.6'	-54.7'	154.8°	52°56.2'	-55.0'	155.4°	14
15	57°25.5'	-53.2'	152.3°	56°32.2'	-53.6'	153.0°	55°38.5'	-54.0'	153.7°	54°44.6'	-54.3'	154.3°	53°50.4'	-54.7'	154.9°	52°55.9'	-54.9'	155.5°	52°01.2'	-55.2'	156.0°	15
16	56°32.2'	-53.6'	153.2°	55°38.5'	-53.9'	153.8°	54°44.5'	-54.3'	154.5°	53°50.3'	-54.6'	155.1°	52°55.7'	-54.9'	155.6°	52°01.0'	-55.2'	156.2°	51°06.0'	-55.4'	156.7°	16
17	55°38.7'	-53.9'	154.0°	54°44.6'	-54.2'	154.6°	53°50.3'	-54.5'	155.2°	52°55.7'	-54.8'	155.8°	52°00.8'	-55.1'	156.3°	51°05.8'	-55.4'	156.8°	50°10.6'	-55.6'	157.3°	17
18	54°44.8'	-54.2'	154.8°	53°50.4'	-54.5'	155.3°	52°55.7'	-54.8'	155.9°	52°00.8'	-55.0'	156.4°	51°05.7'	-55.3'	156.9°	50°10.4'	-55.5'	157.4°	49°15.0'	-55.8'	157.8°	18
19	53°50.6'	-54.4'	155.5°	52°55.9'	-54.7'	156.0°	52°01.0'	-55.0'	156.6°	51°05.8'	-55.2'	157.1°	50°10.4'	-55.5'	157.5°	49°14.9'	-55.7'	158.0°	48°19.2'	-55.9'	158.4°	19
20	52°56.2'	-54.7'	156.2°	52°01.2'	-54.9'	156.7°	51°06.0'	-55.2'	157.2°	50°10.6'	-55.4'	157.7°	49°15.0'	-55.7'								

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

14° 346° LHA

Latitude CONTRARY to Declination

14° 346° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	70°18.0'	-43.7'	134.1°	69°35.5'	-45.1'	136.1°	68°51.7'	-46.4'	137.9°	68°06.6'	-47.5'	139.5°	67°20.4'	-48.6'	141.1°	66°33.2'	-49.5'	142.6°	65°45.1'	-50.3'	143.9°	0
1	69°34.2'	-45.0'	136.1°	68°50.4'	-46.3'	137.9°	68°05.3'	-47.4'	139.6°	67°19.0'	-48.4'	141.2°	66°31.8'	-49.4'	142.6°	65°43.7'	-50.2'	144.0°	64°54.8'	-51.0'	145.2°	1
2	68°49.2'	-46.2'	138.0°	68°04.1'	-47.3'	139.7°	67°17.8'	-48.3'	141.2°	66°30.6'	-49.3'	142.7°	65°42.5'	-50.1'	144.0°	64°53.5'	-50.8'	145.3°	64°03.9'	-51.5'	146.4°	2
3	68°03.1'	-47.2'	139.7°	67°16.8'	-48.2'	141.3°	66°29.5'	-49.1'	142.7°	65°41.3'	-50.0'	144.1°	64°52.4'	-50.7'	145.3°	64°02.7'	-51.4'	146.5°	63°12.3'	-52.1'	147.6°	3
4	67°15.9'	-48.1'	141.4°	66°28.6'	-49.0'	142.8°	65°40.4'	-49.9'	144.1°	64°51.4'	-50.6'	145.4°	64°01.6'	-51.3'	146.6°	63°11.2'	-52.0'	147.7°	62°20.3'	-52.5'	148.7°	4
5	66°27.8'	-48.9'	142.9°	65°39.5'	-49.8'	144.2°	64°50.5'	-50.5'	145.5°	64°00.7'	-51.2'	146.6°	63°10.3'	-51.9'	147.7°	62°19.3'	-52.5'	148.7°	61°27.7'	-53.0'	149.7°	5
6	65°38.9'	-49.7'	144.3°	64°49.8'	-50.5'	145.5°	63°59.9'	-51.2'	146.7°	63°09.5'	-51.8'	147.8°	62°18.4'	-52.4'	148.8°	61°26.8'	-52.9'	149.8°	60°34.7'	-53.4'	150.7°	6
7	64°49.2'	-50.4'	145.6°	63°59.3'	-51.1'	146.8°	63°08.8'	-51.7'	147.9°	62°17.7'	-52.3'	148.9°	61°26.0'	-52.8'	149.9°	60°33.9'	-53.3'	150.8°	59°41.4'	-53.7'	151.6°	7
8	63°58.8'	-51.0'	146.9°	63°08.2'	-51.6'	148.0°	62°17.1'	-52.2'	149.0°	61°25.4'	-52.7'	149.9°	60°33.2'	-53.2'	150.8°	59°40.6'	-53.7'	151.7°	58°47.6'	-54.1'	152.5°	8
9	63°07.8'	-51.5'	148.1°	62°16.6'	-52.1'	149.1°	61°24.9'	-52.7'	150.0°	60°32.7'	-53.1'	150.9°	59°40.0'	-53.6'	151.8°	58°47.0'	-54.0'	152.5°	57°53.5'	-54.4'	153.3°	9
10	62°16.3'	-52.1'	149.2°	61°24.5'	-52.6'	150.1°	60°32.2'	-53.1'	151.0°	59°39.5'	-53.5'	151.9°	58°46.4'	-53.9'	152.6°	57°53.0'	-54.3'	153.4°	56°59.2'	-54.7'	154.1°	10
11	61°24.2'	-52.5'	150.3°	60°31.9'	-53.0'	151.1°	59°39.2'	-53.5'	152.0°	58°46.0'	-53.9'	152.7°	57°52.5'	-54.2'	153.5°	56°58.6'	-54.6'	154.2°	56°04.5'	-54.9'	154.8°	11
12	60°31.7'	-52.9'	151.3°	59°38.9'	-53.4'	152.1°	58°45.7'	-53.8'	152.9°	57°52.1'	-54.2'	153.6°	56°58.2'	-54.5'	154.3°	56°04.0'	-54.9'	154.9°	55°09.6'	-55.2'	155.5°	12
13	59°38.8'	-53.3'	152.2°	58°45.5'	-53.7'	153.0°	57°51.9'	-54.1'	153.7°	56°58.0'	-54.5'	154.4°	56°03.7'	-54.8'	155.0°	55°09.2'	-55.1'	155.6°	54°14.4'	-55.4'	156.2°	13
14	58°45.5'	-53.7'	153.1°	57°51.8'	-54.1'	153.8°	56°57.8'	-54.4'	154.5°	56°03.5'	-54.7'	155.1°	55°08.9'	-55.0'	155.7°	54°14.1'	-55.3'	156.3°	53°19.0'	-55.6'	156.9°	14
15	57°51.8'	-54.0'	153.9°	56°57.7'	-54.4'	154.6°	56°03.4'	-54.7'	155.3°	55°08.8'	-55.0'	155.9°	54°13.9'	-55.3'	156.4°	53°18.8'	-55.5'	157.0°	52°23.4'	-55.8'	157.5°	15
16	56°57.8'	-54.3'	154.8°	56°03.4'	-54.6'	155.4°	55°08.7'	-54.9'	156.0°	54°13.8'	-55.2'	156.6°	53°18.6'	-55.4'	157.2°	52°23.2'	-55.7'	157.6°	51°27.7'	-55.9'	158.1°	16
17	56°03.5'	-54.6'	155.5°	55°08.8'	-54.9'	156.1°	54°13.8'	-55.2'	156.7°	53°18.6'	-55.4'	157.2°	52°23.1'	-55.6'	157.9°	51°27.5'	-55.9'	158.2°	50°31.7'	-56.1'	158.7°	17
18	55°08.9'	-54.8'	156.3°	54°13.9'	-55.1'	156.8°	53°18.6'	-55.4'	157.4°	52°23.1'	-55.6'	157.9°	51°27.5'	-55.8'	158.3°	50°31.6'	-56.1'	158.8°	49°35.6'	-56.3'	159.2°	18
19	54°14.1'	-55.1'	157.0°	53°18.8'	-55.3'	157.5°	52°23.2'	-55.6'	158.0°	51°27.5'	-55.8'	158.5°	50°31.6'	-56.0'	158.9°	49°35.6'	-56.2'	159.3°	48°39.3'	-56.4'	159.7°	19
20	53°19.0'	-55.3'	157.6°	52°23.4'	-55.5'	158.1°	51°27.7'	-55.8'	158.6°	50°31.7'	-56.0'	159.0°	49°35.6'	-56.2'	159.5°	48°39.3'	-56.4'	159.9°	47°42.9'	-56.5'	160.3°	20
21	52°23.7'	-55.5'	158.3°	51°27.9'	-55.7'	158.7°	50°31.9'	-55.9'	159.2°	49°35.7'	-56.1'	159.6°	48°39.4'	-56.3'	160.0°	47°43.0'	-56.5'	160.4°	46°46.4'	-56.7'	160.7°	21
22	51°28.3'	-55.7'	158.9°	50°32.2'	-55.9'	159.3°	49°36.0'	-56.1'	159.8°	48°39.6'	-56.3'	160.1°	47°43.1'	-56.4'	160.5°	46°46.5'	-56.6'	160.9°	45°49.7'	-56.8'	161.2°	22
23	50°32.6'	-55.8'	159.5°	49°36.3'	-56.0'	159.9°	48°39.9'	-56.2'	160.3°	47°43.4'	-56.4'	160.7°	46°46.7'	-56.6'	161.0°	45°49.9'	-56.7'	161.4°	44°53.0'	-56.9'	161.7°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

14° 346° LHA

Latitude CONTRARY to DECLINATION

14° 346° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

13° 347° LHA

Latitude CONTRARY to Declination

13° 347° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	70°59.0'	-45.2'	136.3°	70°14.9'	-46.5'	138.3°	69°29.5'	-47.7'	140.1°	68°43.0'	-48.8'	141.7°	67°55.4'	-49.7'	143.2°	67°06.9'	-50.6'	144.7°	66°17.5'	-51.4'	146.0°	0
1	70°13.8'	-46.4'	138.3°	69°28.4'	-47.6'	140.1°	68°41.8'	-48.7'	141.8°	67°54.2'	-49.6'	143.3°	67°05.7'	-50.5'	144.7°	66°16.3'	-51.3'	146.0°	65°26.2'	-51.9'	147.2°	1
2	69°27.4'	-47.5'	140.2°	68°40.8'	-48.6'	141.8°	67°53.1'	-49.5'	143.3°	67°04.6'	-50.4'	144.7°	66°15.2'	-51.2'	146.1°	65°25.0'	-51.9'	147.3°	64°34.2'	-52.5'	148.4°	2
3	68°39.9'	-48.5'	141.9°	67°52.2'	-49.4'	143.4°	67°03.6'	-50.3'	144.8°	66°14.2'	-51.1'	146.1°	65°24.0'	-51.8'	147.3°	64°33.2'	-52.4'	148.5°	63°41.7'	-53.0'	149.5°	3
4	67°51.4'	-49.3'	143.5°	67°02.8'	-50.2'	144.9°	66°13.3'	-51.0'	146.2°	65°23.1'	-51.7'	147.4°	64°32.3'	-52.3'	148.5°	63°40.8'	-52.9'	149.6°	62°48.8'	-53.4'	150.6°	4
5	67°02.1'	-50.1'	144.9°	66°12.6'	-50.9'	146.3°	65°22.4'	-51.6'	147.5°	64°31.5'	-52.2'	148.6°	63°40.0'	-52.8'	149.7°	62°47.9'	-53.3'	150.6°	61°55.4'	-53.8'	151.6°	5
6	66°12.0'	-50.8'	146.3°	65°21.7'	-51.5'	147.5°	64°30.8'	-52.1'	148.7°	63°39.2'	-52.7'	149.7°	62°47.2'	-53.2'	150.7°	61°54.6'	-53.7'	151.6°	61°01.6'	-54.2'	152.5°	6
7	65°21.2'	-51.4'	147.6°	64°30.2'	-52.1'	148.8°	63°38.6'	-52.6'	149.8°	62°46.5'	-53.2'	150.8°	61°53.9'	-53.7'	151.7°	61°00.9'	-54.1'	152.6°	60°07.4'	-54.5'	153.4°	7
8	64°29.8'	-52.0'	148.8°	63°38.1'	-52.6'	149.9°	62°46.0'	-53.1'	150.9°	61°53.3'	-53.6'	151.8°	61°00.3'	-54.0'	152.6°	60°06.8'	-54.4'	153.4°	59°12.9'	-54.8'	154.2°	8
9	63°37.8'	-52.5'	150.0°	62°45.6'	-53.0'	151.0°	61°52.9'	-53.5'	151.9°	60°59.8'	-54.0'	152.7°	60°06.2'	-54.4'	153.5°	59°12.4'	-54.7'	154.3°	58°18.1'	-55.1'	155.0°	9
10	62°45.3'	-53.0'	151.1°	61°52.5'	-53.4'	152.0°	60°59.4'	-53.9'	152.8°	60°05.8'	-54.3'	153.6°	59°11.9'	-54.7'	154.4°	58°17.6'	-55.0'	155.1°	57°23.1'	-55.3'	155.7°	10
11	61°52.3'	-53.4'	152.1°	60°59.1'	-53.8'	152.9°	60°05.5'	-54.2'	153.7°	59°11.5'	-54.6'	154.5°	58°17.2'	-54.9'	155.2°	57°22.6'	-55.3'	155.8°	56°27.8'	-55.5'	156.4°	11
12	60°58.9'	-53.8'	153.0°	60°05.3'	-54.2'	153.8°	59°11.3'	-54.5'	154.6°	58°16.9'	-54.9'	155.3°	57°22.3'	-55.2'	155.9°	56°27.4'	-55.5'	156.5°	55°32.2'	-55.8'	157.1°	12
13	60°05.2'	-54.1'	153.9°	59°11.1'	-54.5'	154.7°	58°16.7'	-54.8'	155.4°	57°22.0'	-55.1'	156.0°	56°27.1'	-55.4'	156.6°	55°31.9'	-55.7'	157.2°	54°36.4'	-56.0'	157.8°	13
14	59°11.0'	-54.4'	154.8°	58°16.6'	-54.8'	155.5°	57°21.9'	-55.1'	156.1°	56°26.9'	-55.4'	156.7°	55°31.6'	-55.7'	157.3°	54°36.2'	-55.9'	157.9°	53°40.5'	-56.1'	158.4°	14
15	58°16.6'	-54.7'	155.6°	57°21.8'	-55.0'	156.2°	56°26.8'	-55.3'	156.9°	55°31.5'	-55.6'	157.4°	54°36.0'	-55.9'	158.0°	53°40.3'	-56.1'	158.5°	52°44.4'	-56.3'	159.0°	15
16	57°21.9'	-55.0'	156.4°	56°26.8'	-55.3'	157.0°	55°31.5'	-55.6'	157.5°	54°35.9'	-55.8'	158.1°	53°40.1'	-56.0'	158.6°	52°44.2'	-56.3'	159.1°	51°48.0'	-56.5'	159.5°	16
17	56°26.9'	-55.2'	157.1°	55°31.5'	-55.5'	157.7°	54°35.9'	-55.8'	158.2°	53°40.1'	-56.0'	158.7°	52°44.1'	-56.2'	159.2°	51°47.9'	-56.4'	159.6°	50°51.6'	-56.6'	160.1°	17
18	55°31.6'	-55.5'	157.8°	54°36.0'	-55.7'	158.3°	53°40.1'	-56.0'	158.8°	52°44.1'	-56.2'	159.3°	51°47.9'	-56.4'	159.8°	50°51.5'	-56.6'	160.2°	49°55.0'	-56.7'	160.6°	18
19	54°36.2'	-55.7'	158.5°	53°40.3'	-55.9'	159.0°	52°44.2'	-56.1'	159.4°	51°47.9'	-56.3'	159.9°	50°51.5'	-56.5'	160.3°	49°54.9'	-56.7'	160.7°	48°58.2'	-56.9'	161.1°	19
20	53°40.5'	-55.9'	159.1°	52°44.4'	-56.1'	159.6°	51°48.0'	-56.3'	160.0°	50°51.6'	-56.5'	160.4°	49°55.0'	-56.7'	160.8°							

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

12° 348° LHA

Latitude CONTRARY to Declination

12° 348° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	71°38.3'	-46.7'	138.7°	70°52.6'	-47.9'	140.6°	70°05.7'	-49.1'	142.4°	69°17.6'	-50.0'	144.0°	68°28.7'	-50.9'	145.5°	67°38.8'	-51.7'	146.9°	66°48.2'	-52.4'	148.1°	0
1	70°51.6'	-47.8'	140.7°	70°04.7'	-49.0'	142.4°	69°16.6'	-49.9'	144.0°	68°27.6'	-50.8'	145.5°	67°37.7'	-51.6'	146.9°	66°47.1'	-52.3'	148.2°	65°55.8'	-52.9'	149.4°	1
2	70°03.8'	-48.9'	142.5°	69°15.7'	-49.8'	144.1°	68°26.7'	-50.7'	145.6°	67°36.8'	-51.5'	146.9°	66°46.1'	-52.2'	148.2°	65°54.8'	-52.8'	149.4°	65°02.9'	-53.4'	150.5°	2
3	69°15.0'	-49.8'	144.1°	68°25.9'	-50.6'	145.6°	67°36.0'	-51.4'	147.0°	66°45.3'	-52.1'	148.3°	65°53.9'	-52.8'	149.4°	65°02.0'	-53.3'	150.5°	64°09.5'	-53.8'	151.6°	3
4	68°25.2'	-50.6'	145.7°	67°35.2'	-51.3'	147.0°	66°44.5'	-52.0'	148.3°	65°53.2'	-52.7'	149.5°	65°01.2'	-53.3'	150.6°	64°08.6'	-53.8'	151.6°	63°15.6'	-54.2'	152.6°	4
5	67°34.6'	-51.3'	147.1°	66°43.9'	-52.0'	148.4°	65°52.5'	-52.6'	149.6°	65°00.5'	-53.2'	150.6°	64°07.9'	-53.7'	151.7°	63°14.9'	-54.2'	152.6°	62°21.4'	-54.6'	153.5°	5
6	66°43.4'	-51.9'	148.5°	65°51.9'	-52.5'	149.6°	64°59.9'	-53.1'	150.7°	64°07.3'	-53.6'	151.7°	63°14.2'	-54.1'	152.7°	62°20.7'	-54.5'	153.5°	61°26.8'	-54.9'	154.4°	6
7	65°51.5'	-52.5'	149.7°	64°59.4'	-53.0'	150.8°	64°06.8'	-53.6'	151.8°	63°13.7'	-54.0'	152.7°	62°20.1'	-54.5'	153.6°	61°26.2'	-54.9'	154.4°	60°31.9'	-55.2'	155.2°	7
8	64°59.0'	-53.0'	150.9°	64°06.4'	-53.5'	151.9°	63°13.2'	-54.0'	152.8°	62°19.6'	-54.4'	153.7°	61°25.7'	-54.8'	154.5°	60°31.3'	-55.1'	155.3°	59°36.7'	-55.5'	156.0°	8
9	64°06.0'	-53.4'	152.0°	63°12.9'	-53.9'	152.9°	62°19.2'	-54.3'	153.8°	61°25.2'	-54.7'	154.6°	60°30.9'	-55.1'	155.3°	59°36.2'	-55.4'	156.1°	58°41.2'	-55.7'	156.7°	9
10	63°12.6'	-53.9'	153.0°	62°18.9'	-54.3'	153.9°	61°24.9'	-54.7'	154.7°	60°30.5'	-55.0'	155.4°	59°35.8'	-55.4'	156.1°	58°40.8'	-55.7'	156.8°	57°45.5'	-55.9'	157.4°	10
11	62°18.7'	-54.2'	153.9°	61°24.7'	-54.6'	154.8°	60°30.2'	-55.0'	155.5°	59°35.5'	-55.3'	156.2°	58°40.4'	-55.6'	156.9°	57°45.1'	-55.9'	157.5°	56°49.5'	-56.1'	158.1°	11
12	61°24.5'	-54.6'	154.9°	60°30.0'	-54.9'	155.6°	59°35.2'	-55.3'	156.3°	58°40.1'	-55.6'	157.0°	57°44.8'	-55.8'	157.6°	56°49.2'	-56.1'	158.2°	55°53.4'	-56.3'	158.7°	12
13	60°29.9'	-54.9'	155.7°	59°35.1'	-55.2'	156.4°	58°40.0'	-55.5'	157.1°	57°44.6'	-55.8'	157.7°	56°49.0'	-56.0'	158.3°	55°53.1'	-56.3'	158.8°	54°57.1'	-56.5'	159.3°	13
14	59°35.1'	-55.2'	156.5°	58°39.9'	-55.5'	157.2°	57°44.5'	-55.7'	157.8°	56°48.8'	-56.0'	158.4°	55°52.9'	-56.2'	158.9°	54°56.8'	-56.5'	159.4°	54°00.6'	-56.7'	159.9°	14
15	58°39.9'	-55.4'	157.3°	57°44.4'	-55.7'	157.9°	56°48.7'	-56.0'	158.5°	55°52.8'	-56.2'	159.0°	54°56.7'	-56.4'	159.5°	54°00.4'	-56.6'	160.0°	53°03.9'	-56.8'	160.5°	15
16	57°44.5'	-55.7'	158.0°	56°48.7'	-55.9'	158.6°	55°52.7'	-56.2'	159.1°	54°56.6'	-56.4'	159.6°	54°00.3'	-56.6'	160.1°	53°03.7'	-56.8'	160.6°	52°07.1'	-56.9'	161.0°	16
17	56°48.8'	-55.9'	158.7°	55°52.8'	-56.1'	159.2°	54°56.6'	-56.3'	159.7°	54°00.2'	-56.5'	160.2°	53°03.7'	-56.7'	160.7°	52°07.0'	-56.9'	161.1°	51°10.1'	-57.1'	161.5°	17
18	55°52.9'	-56.1'	159.4°	54°56.7'	-56.3'	159.9°	54°00.3'	-56.5'	160.3°	53°03.7'	-56.7'	160.8°	52°06.9'	-56.9'	161.2°	51°10.1'	-57.0'	161.6°	50°13.1'	-57.2'	162.0°	18
19	54°56.8'	-56.3'	160.0°	54°00.4'	-56.5'	160.5°	53°03.7'	-56.7'	160.9°	52°07.0'	-56.8'	161.3°	51°10.1'	-57.0'	161.7°	50°13.0'	-57.2'	162.1°	49°15.9'	-57.3'	162.5°	19
20	54°00.6'	-56.4'	160.6°	53°03.9'	-56.6'	161.0°	52°07.1'	-56.8'	161.4°	51°10.1'	-57.0'	161.8°	50°13.1'	-57.1'	162.2°	49°15.9'	-57.3'	162.6°	48°18.6'	-57.4'	162.9°	20
21	53°04.1'	-56.6'	161.2°	52°07.3'	-56.8'	161.6°	51°10.3'	-56.9'	162.0°	50°13.2'	-57.1'	162.3°	49°15.9'	-57.2'	162.7°	48°18.6'	-57.4'	163.0°	47°21.2'	-57.5'	163.4°	21
22	52°07.5'	-56.7'	161.7°	51°10.5'	-56.9'	162.1°	50°13.3'	-57.1'	162.5°	49°16.1'	-57.2'	162.8°	48°18.7'	-57.3'	163.2°	47°21.2'	-57.5'	163.5°	46°23.7'	-57.6'	163.8°	22
23	51°10.8'	-56.9'	162.2°	50°13.6'	-57.0'	162.6°	49°16.3'	-57.2'	162.9°	48°18.9'	-57.3'	163.3°	47°21.4'	-57.4'	163.6°	46°23.8'	-57.6'	163.9°	45°26.1'	-57.7'	164.2°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

12° 348° LHA

Latitude CONTRARY to DECLINATION

12° 348° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

11° 349° LHA

Latitude CONTRARY to Declination

11° 349° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	72°15.8'	-48.2'	141.2°	71°28.4'	-49.4'	143.1°	70°39.9'	-50.4'	144.8°	69°50.4'	-51.3'	146.4°	69°00.0'	-52.1'	147.8°	68°08.9'	-52.8'	149.2°	67°17.0'	-53.4'	150.4°	0
1	71°27.5'	-49.3'	143.1°	70°39.1'	-50.3'	144.8°	69°49.5'	-51.2'	146.4°	68°59.1'	-52.0'	147.9°	68°07.9'	-52.7'	149.2°	67°16.1'	-53.3'	150.4°	66°23.6'	-53.9'	151.5°	1
2	70°38.3'	-50.2'	144.9°	69°48.8'	-51.1'	146.5°	68°58.3'	-51.9'	147.9°	68°07.1'	-52.6'	149.2°	67°15.3'	-53.2'	150.4°	66°22.8'	-53.8'	151.6°	65°29.7'	-54.3'	152.6°	2
3	69°48.1'	-51.0'	146.5°	68°57.6'	-51.8'	147.9°	68°06.4'	-52.5'	149.3°	67°14.5'	-53.2'	150.5°	66°22.0'	-53.7'	151.6°	65°29.0'	-54.2'	152.7°	64°35.4'	-54.7'	153.6°	3
4	68°57.1'	-51.8'	148.0°	68°05.8'	-52.5'	149.3°	67°13.9'	-53.1'	150.5°	66°21.3'	-53.7'	151.7°	65°28.3'	-54.2'	152.7°	64°34.7'	-54.6'	153.7°	63°40.7'	-55.0'	154.6°	4
5	68°05.3'	-52.4'	149.4°	67°13.3'	-53.0'	150.6°	66°20.8'	-53.6'	151.7°	65°27.7'	-54.1'	152.8°	64°33.6'	-54.5'	153.8°	63°40.1'	-55.0'	154.6°	62°45.1'	-55.4'	155.5°	5
6	67°12.9'	-53.0'	150.7°	66°20.3'	-53.5'	151.8°	65°27.2'	-54.1'	152.8°	64°33.6'	-54.5'	153.8°	63°39.5'	-54.9'	154.7°	62°45.1'	-55.3'	155.5°	61°50.3'	-55.6'	156.3°	6
7	66°19.9'	-53.5'	151.9°	65°26.8'	-54.0'	152.9°	64°33.1'	-54.5'	153.8°	63°39.1'	-54.9'	154.7°	62°44.6'	-55.2'	155.6°	61°49.8'	-55.6'	156.3°	60°54.7'	-55.9'	157.1°	7
8	65°26.4'	-53.9'	153.0°	64°32.8'	-54.4'	153.9°	63°38.7'	-54.8'	154.8°	62°44.2'	-55.2'	155.6°	61°49.4'	-55.5'	156.4°	60°54.2'	-55.8'	157.1°	59°58.8'	-56.1'	157.8°	8
9	64°32.5'	-54.3'	154.0°	63°38.4'	-54.8'	154.9°	62°43.9'	-55.1'	155.7°	61°49.0'	-55.5'	156.5°	60°53.8'	-55.8'	157.2°	59°58.4'	-56.1'	157.9°	59°02.7'	-56.3'	158.5°	9
10	63°38.1'	-54.7'	155.0°	62°43.6'	-55.1'	155.8°	61°48.7'	-55.4'	156.6°	60°53.5'	-55.7'	157.3°	59°58.0'	-56.0'	157.9°	59°02.3'	-56.3'	158.6°	58°06.3'	-56.5'	159.2°	10
11	62°43.4'	-55.0'	155.9°	61°48.5'	-55.4'	156.6°	60°53.3'	-55.7'	157.4°	59°57.8'	-56.0'	158.0°	59°02.0'	-56.2'	158.7°	58°06.0'	-56.5'	159.2°	57°09.8'	-56.7'	159.8°	11
12	61°48.4'	-55.3'	156.7°	60°53.1'	-55.7'	157.4°	59°57.6'	-55.9'	158.1°	59°01.8'	-56.2'	158.7°	58°05.8'	-56.4'	159.3°	57°09.5'	-56.7'	159.9°	56°13.1'	-56.9'	160.4°	12
13	60°53.0'	-55.6'	157.5°	59°57.5'	-55.9'	158.2°	59°01.6'	-56.2'	158.8°	58°05.6'	-56.4'	159.4°	57°09.3'	-56.6'	160.0°	56°12.8'	-56.8'	160.5°	55°16.2'	-57.0'	161.0°	13
14	59°57.4'	-55.9'	158.3°	59°01.6'	-56.1'	158.9°	58°05.5'	-56.4'	159.5°	57°09.2'	-56.6'	160.0°	56°12.7'	-56.8'	160.6°	55°16.0'	-57.0'	161.0°	54°19.2'	-57.2'	161.5°	14
15	59°01.6'	-56.1'	159.0°	58°05.4'	-56.3'	159.6°	57°09.1'	-56.6'	160.1°	56°12.6'	-56.8'	160.6°	55°15.9'	-57.0'	161.1°	54°19.0'	-57.1'	161.6°	53°22.0'	-57.3'	162.0°	15
16	58°05.5'	-56.3'	159.7°	57°09.1'	-56.5'	160.2°	56°12.5'	-56.7'	160.7°	55°15.8'	-56.9'	161.2°	54°18.9'	-57.1'	161.7°	53°21.9'	-57.3'	162.1°	52°24.7'	-57.4'	162.5°	16
17	57°09.2'	-56.5'	160.3°	56°12.6'	-56.7'	160.8°	55°15.8'	-56.9'	161.3°	54°18.9'	-57.1'	161.8°	53°21.8'	-57.2'	162.2°	52°24.6'	-57.4'	162.6°	51°27.3'	-57.5'	163.0°	17
18	56°12.7'	-56.7'	161.0°	55°15.9'	-56.9'	161.4°	54°18.9'	-57.0'	161.9°	53°21.8'	-57.2'	162.3°	52°24.6'	-57.3'	162.7°	51°27.3'	-57.5'	163.1°	50°29.8'	-57.6'	163.4°	18
19	55°16.0'	-56.8'	161.5°	54°19.0'	-57.0'	162.0°	53°21.9'	-57.2'	162.4°	52°24.6'	-57.3'	162.8°	51°27.3'	-57.5'	163.2°	50°29.8'	-57.6'	163.5°	49°32.2'	-57.7'	163.9°	19
20	54°19.2'	-57.0'	162.1°	53°22.0'	-57.1'	162.5°	52°24.7'	-57.3'	162.9°	51°27.3'	-57.4'	163.3°	50°29.8'	-57.6'								

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

10° 350° LHA

Latitude CONTRARY to Declination

10° 350° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	72°51.2'	-49.8'	143.9°	72°02.2'	-50.8'	145.7°	71°12.1'	-51.7'	147.4°	70°21.1'	-52.5'	148.9°	69°29.4'	-53.2'	150.3°	68°36.9'	-53.8'	151.6°	67°43.9'	-54.4'	152.7°	0
1	72°01.4'	-50.7'	145.8°	71°11.4'	-51.6'	147.4°	70°20.4'	-52.4'	148.9°	69°28.6'	-53.1'	150.3°	68°36.2'	-53.8'	151.6°	67°43.1'	-54.3'	152.7°	66°49.5'	-54.8'	153.8°	1
2	71°10.7'	-51.6'	147.5°	70°19.7'	-52.4'	149.0°	69°27.9'	-53.1'	150.3°	68°35.5'	-53.7'	151.6°	67°42.4'	-54.2'	152.8°	66°48.8'	-54.7'	153.8°	65°54.7'	-55.2'	154.8°	2
3	70°19.2'	-52.3'	149.0°	69°27.4'	-53.0'	150.4°	68°34.9'	-53.6'	151.7°	67°41.8'	-54.2'	152.8°	66°48.1'	-54.7'	153.9°	65°54.0'	-55.1'	154.9°	64°59.5'	-55.5'	155.8°	3
4	69°26.9'	-52.9'	150.4°	68°34.3'	-53.6'	151.7°	67°41.2'	-54.1'	152.9°	66°47.6'	-54.6'	153.9°	65°53.5'	-55.1'	154.9°	64°58.9'	-55.5'	155.8°	64°04.0'	-55.8'	156.7°	4
5	68°33.9'	-53.5'	151.7°	67°40.8'	-54.1'	152.9°	66°47.1'	-54.6'	154.0°	65°53.0'	-55.0'	155.0°	64°58.4'	-55.4'	155.9°	64°03.5'	-55.8'	156.7°	63°08.2'	-56.1'	157.5°	5
6	67°40.4'	-54.0'	153.0°	66°46.7'	-54.5'	154.0°	65°52.5'	-55.0'	155.0°	64°58.0'	-55.4'	155.9°	64°03.0'	-55.7'	156.8°	63°07.7'	-56.0'	157.5°	62°12.1'	-56.3'	158.3°	6
7	66°46.4'	-54.5'	154.1°	65°52.2'	-54.9'	155.1°	64°57.6'	-55.3'	156.0°	64°02.6'	-55.7'	156.8°	63°07.3'	-56.0'	157.6°	62°11.7'	-56.3'	158.3°	61°15.8'	-56.5'	159.0°	7
8	65°51.9'	-54.9'	155.1°	64°57.3'	-55.3'	156.0°	64°02.3'	-55.6'	156.9°	63°06.9'	-55.9'	157.6°	62°11.3'	-56.2'	158.4°	61°15.4'	-56.5'	159.0°	60°19.2'	-56.7'	159.7°	8
9	64°57.1'	-55.2'	156.1°	64°02.0'	-55.6'	156.9°	63°06.7'	-55.9'	157.7°	62°11.0'	-56.2'	158.4°	61°15.1'	-56.5'	159.1°	60°18.9'	-56.7'	159.7°	59°22.5'	-56.9'	160.3°	9
10	64°01.8'	-55.5'	157.0°	63°06.4'	-55.9'	157.8°	62°10.8'	-56.2'	158.5°	61°14.8'	-56.4'	159.2°	60°18.6'	-56.7'	159.8°	59°22.2'	-56.9'	160.4°	58°25.6'	-57.1'	160.9°	10
11	63°06.3'	-55.8'	157.9°	62°10.6'	-56.1'	158.6°	61°14.6'	-56.4'	159.2°	60°18.4'	-56.6'	159.9°	59°21.9'	-56.9'	160.5°	58°25.3'	-57.1'	161.0°	57°28.5'	-57.2'	161.5°	11
12	62°10.5'	-56.1'	158.7°	61°14.5'	-56.3'	159.3°	60°18.2'	-56.6'	159.9°	59°21.8'	-56.8'	160.5°	58°25.1'	-57.0'	161.1°	57°28.2'	-57.2'	161.6°	56°31.2'	-57.4'	162.1°	12
13	61°14.4'	-56.3'	159.4°	60°18.1'	-56.6'	160.0°	59°21.6'	-56.8'	160.6°	58°24.9'	-57.0'	161.2°	57°28.1'	-57.2'	161.7°	56°31.0'	-57.3'	162.1°	55°33.9'	-57.5'	162.6°	13
14	60°18.1'	-56.5'	160.1°	59°21.6'	-56.8'	160.7°	58°24.8'	-57.0'	161.2°	57°27.9'	-57.1'	161.7°	56°30.9'	-57.3'	162.2°	55°33.7'	-57.5'	162.7°	54°36.3'	-57.6'	163.1°	14
15	59°21.6'	-56.7'	160.8°	58°24.8'	-56.9'	161.3°	57°27.9'	-57.1'	161.8°	56°30.8'	-57.3'	162.3°	55°33.6'	-57.4'	162.7°	54°36.2'	-57.6'	163.2°	53°38.7'	-57.7'	163.6°	15
16	58°24.8'	-56.9'	161.4°	57°27.9'	-57.1'	161.9°	56°30.8'	-57.3'	162.4°	55°33.5'	-57.4'	162.8°	54°36.1'	-57.6'	163.3°	53°38.6'	-57.7'	163.6°	52°41.0'	-57.8'	164.0°	16
17	57°27.9'	-57.1'	162.0°	56°30.8'	-57.2'	162.5°	55°33.5'	-57.4'	162.9°	54°36.1'	-57.5'	163.3°	53°38.6'	-57.7'	163.7°	52°40.9'	-57.8'	164.1°	51°43.1'	-57.9'	164.5°	17
18	56°30.9'	-57.2'	162.6°	55°33.6'	-57.4'	163.0°	54°36.1'	-57.5'	163.4°	53°38.6'	-57.7'	163.8°	52°40.9'	-57.8'	164.2°	51°43.1'	-57.9'	164.5°	50°45.2'	-58.0'	164.9°	18
19	55°33.7'	-57.3'	163.1°	54°36.2'	-57.5'	163.5°	53°38.6'	-57.6'	163.9°	52°40.9'	-57.8'	164.3°	51°43.1'	-57.9'	164.6°	50°45.2'	-58.0'	165.0°	49°47.2'	-58.1'	165.3°	19
20	54°36.3'	-57.5'	163.6°	53°38.7'	-57.6'	164.0°	52°41.0'	-57.7'	164.4°	51°43.1'	-57.9'	164.7°	50°45.2'	-58.0'	165.1°	49°47.2'	-58.1'	165.4°	48°49.1'	-58.2'	165.7°	20
21	53°38.9'	-57.6'	164.1°	52°41.1'	-57.7'	164.5°	51°43.3'	-57.8'	164.8°	50°45.3'	-57.9'	165.2°	49°47.3'	-58.0'	165.5°	48°49.1'	-58.1'	165.7°	47°51.0'	-58.2'	166.0°	21
22	52°41.3'	-57.7'	164.6°	51°43.4'	-57.8'	164.9°	50°45.4'	-57.9'	165.3°	49°47.4'	-58.0'	165.6°	48°49.2'	-58.1'	165.8°	47°51.0'	-58.2'	166.1°	46°52.7'	-58.3'	166.4°	22
23	51°43.6'	-57.8'	165.0°	50°45.6'	-57.9'	165.4°	49°47.5'	-58.0'	165.7°	48°49.3'	-58.1'	165.9°	47°51.1'	-58.2'	166.2°	46°52.8'	-58.3'	166.5°	45°54.4'	-58.4'	166.7°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

10° 350° LHA

Latitude CONTRARY to DECLINATION

10° 350° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

9° 351° LHA

Latitude CONTRARY to Declination

9° 351° LHA

Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	73°24.3'	-51.3'	146.8°	72°33.6'	-52.2'	148.5°	71°42.0'	-53.0'	150.1°	70°49.6'	-53.7'	151.6°	69°56.5'	-54.3'	152.9°	69°02.9'	-54.9'	154.1°	68°08.6'	-55.3'	155.2°	0
1	72°33.0'	-52.2'	148.6°	71°41.4'	-53.0'	150.1°	70°49.0'	-53.6'	151.6°	69°55.9'	-54.3'	152.9°	69°02.2'	-54.8'	154.1°	68°08.0'	-55.3'	155.2°	67°13.3'	-55.7'	156.2°	1
2	71°40.8'	-52.9'	150.2°	70°48.5'	-53.6'	151.6°	69°55.3'	-54.2'	152.9°	69°01.6'	-54.7'	154.1°	68°07.4'	-55.2'	155.2°	67°12.7'	-55.6'	156.2°	66°17.7'	-56.0'	157.1°	2
3	70°48.0'	-53.5'	151.6°	69°54.9'	-54.1'	152.9°	69°01.1'	-54.7'	154.1°	68°06.9'	-55.2'	155.2°	67°12.2'	-55.6'	156.2°	66°17.1'	-56.0'	157.1°	65°21.7'	-56.3'	158.0°	3
4	69°54.5'	-54.1'	153.0°	69°00.7'	-54.6'	154.2°	68°06.5'	-55.1'	155.3°	67°11.8'	-55.5'	156.3°	66°16.6'	-55.9'	157.2°	65°21.2'	-56.2'	158.0°	64°25.4'	-56.5'	158.8°	4
5	69°00.4'	-54.6'	154.2°	68°06.1'	-55.1'	155.3°	67°11.4'	-55.5'	156.3°	66°16.2'	-55.9'	157.2°	65°20.7'	-56.2'	158.1°	64°24.5'	-56.5'	158.9°	63°28.8'	-56.7'	159.6°	5
6	68°05.8'	-55.0'	155.4°	67°11.0'	-55.4'	156.3°	66°15.9'	-55.8'	157.3°	65°20.4'	-56.2'	158.1°	64°24.5'	-56.5'	158.9°	63°28.4'	-56.7'	159.6°	62°32.1'	-57.0'	160.3°	6
7	67°10.8'	-55.4'	156.4°	66°15.6'	-55.8'	157.3°	65°20.1'	-56.1'	158.2°	64°24.2'	-56.4'	158.9°	63°28.1'	-56.7'	159.7°	62°31.7'	-56.9'	160.3°	61°35.1'	-57.2'	161.0°	7
8	66°15.4'	-55.7'	157.4°	65°19.8'	-56.1'	158.2°	64°23.9'	-56.4'	159.0°	63°27.8'	-56.6'	159.7°	62°31.4'	-56.9'	160.4°	61°34.8'	-57.1'	161.0°	60°37.9'	-57.3'	161.6°	8
9	65°19.6'	-56.0'	158.3°	64°23.7'	-56.3'	159.1°	63°27.6'	-56.6'	159.8°	62°31.2'	-56.9'	160.4°	61°34.5'	-57.1'	161.1°	60°37.7'	-57.3'	161.6°	59°40.6'	-57.5'	162.2°	9
10	64°23.6'	-56.3'	159.1°	63°27.4'	-56.6'	159.8°	62°31.0'	-56.8'	160.5°	61°34.3'	-57.1'	161.1°	60°37.4'	-57.3'	161.7°	59°40.4'	-57.4'	162.2°	58°43.1'	-57.6'	162.7°	10
11	63°27.3'	-56.6'	159.9°	62°30.8'	-56.8'	160.6°	61°34.1'	-57.0'	161.2°	60°37.2'	-57.2'	161.8°	59°40.2'	-57.4'	162.3°	58°42.9'	-57.6'	162.8°	57°45.5'	-57.7'	163.3°	11
12	62°30.7'	-56.8'	160.6°	61°34.0'	-57.0'	161.3°	60°37.1'	-57.2'	161.8°	59°40.0'	-57.4'	162.4°	58°42.8'	-57.6'	162.9°	57°45.3'	-57.7'	163.3°	56°47.8'	-57.9'	163.8°	12
13	61°34.0'	-57.0'	161.3°	60°37.0'	-57.2'	161.9°	59°39.9'	-57.4'	162.4°	58°42.6'	-57.5'	162.9°	57°45.2'	-57.7'	163.4°	56°47.6'	-57.8'	163.8°	55°49.9'	-58.0'	164.3°	13
14	60°37.0'	-57.1'	162.0°	59°39.9'	-57.3'	162.5°	58°42.6'	-57.5'	163.0°	57°45.1'	-57.7'	163.5°	56°47.5'	-57.8'	163.9°	55°49.8'	-57.9'	164.3°	54°52.0'	-58.1'	164.7°	14
15	59°39.9'	-57.3'	162.6°	58°42.5'	-57.5'	163.1°	57°45.1'	-57.6'	163.6°	56°47.4'	-57.8'	164.0°	55°49.7'	-57.9'	164.4°	54°51.9'	-58.0'	164.8°	53°53.9'	-58.1'	165.1°	15
16	58°42.6'	-57.5'	163.2°	57°45.1'	-57.6'	163.6°	56°47.4'	-57.8'	164.1°	55°49.7'	-57.9'	164.5°	54°51.8'	-58.0'	164.9°	53°53.8'	-58.1'	165.2°	52°55.8'	-58.2'	165.6°	16
17	57°45.1'	-57.6'	163.7°	56°47.4'	-57.7'	164.1°	55°49.7'	-57.9'	164.6°	54°51.8'	-58.0'	164.9°	53°53.8'	-58.1'	165.3°	52°55.7'	-58.2'	165.6°	51°57.6'	-58.3'	166.0°	17
18	56°47.5'	-57.7'	164.2°	55°49.7'	-57.8'	164.6°	54°51.8'	-58.0'	165.0°	53°53.8'	-58.1'	165.4°	52°55.7'	-58.2'	165.7°	51°57.5'	-58.3'	166.0°	50°59.2'	-58.4'	166.3°	18
19	55°49.8'	-57.8'	164.7°	54°51.9'	-57.9'	165.1°	53°53.8'	-58.1'	165.5°	52°55.7'	-58.2'	165.8°	51°57.5'	-58.3'	166.1°	50°59.2'	-58.4'	166.4°	50°00.9'	-58.4'	166.7°	19
20	54°52.0'	-57.9'	165.2°	53°53.9'	-58.0'	165.6°	52°55.8'	-58.1'	165.9°	51°57.6'	-58.2'	166.2°	50°59.2'	-58.3'	166.5°	50						

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

8° 352° LHA			Latitude CONTRARY to Declination						8° 352° LHA													
Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	73°54.9'	-52.8'	149.8°	73°02.6'	-53.6'	151.5°	72°09.5'	-54.3'	153.0°	71°15.7'	-54.9'	154.3°	70°21.4'	-55.4'	155.5°	69°26.5'	-55.8'	156.7°	68°31.2'	-56.2'	157.7°	0
1	73°02.1'	-53.5'	151.5°	72°09.0'	-54.2'	153.0°	71°15.2'	-54.8'	154.3°	70°20.9'	-55.3'	155.6°	69°26.0'	-55.8'	156.7°	68°30.7'	-56.2'	157.7°	67°35.0'	-56.5'	158.6°	1
2	72°08.5'	-54.2'	153.0°	71°14.8'	-54.8'	154.4°	70°20.4'	-55.3'	155.6°	69°25.5'	-55.7'	156.7°	68°30.2'	-56.1'	157.7°	67°34.5'	-56.5'	158.6°	66°38.5'	-56.8'	159.5°	2
3	71°14.4'	-54.7'	154.4°	70°20.0'	-55.2'	155.6°	69°25.1'	-55.7'	156.7°	68°29.8'	-56.1'	157.7°	67°34.1'	-56.4'	158.6°	66°38.1'	-56.7'	159.5°	65°41.7'	-57.0'	160.3°	3
4	70°19.7'	-55.2'	155.6°	69°24.8'	-55.6'	156.7°	68°29.5'	-56.0'	157.7°	67°33.7'	-56.4'	158.7°	66°37.7'	-56.7'	159.5°	65°41.4'	-57.0'	160.3°	64°44.7'	-57.2'	161.0°	4
5	69°24.5'	-55.6'	156.8°	68°29.2'	-56.0'	157.8°	67°33.4'	-56.3'	158.7°	66°37.4'	-56.7'	159.5°	65°41.0'	-56.9'	160.3°	64°44.4'	-57.2'	161.0°	63°47.5'	-57.4'	161.7°	5
6	68°28.9'	-56.0'	157.8°	67°33.2'	-56.3'	158.7°	66°37.1'	-56.6'	159.6°	65°40.7'	-56.9'	160.4°	64°44.1'	-57.1'	161.1°	63°47.2'	-57.4'	161.7°	62°50.1'	-57.6'	162.4°	6
7	67°33.0'	-56.3'	158.8°	66°36.9'	-56.6'	159.6°	65°40.5'	-56.9'	160.4°	64°43.8'	-57.1'	161.1°	63°46.9'	-57.3'	161.8°	62°49.8'	-57.5'	162.4°	61°52.6'	-57.7'	163.0°	7
8	66°36.7'	-56.6'	159.7°	65°40.3'	-56.8'	160.5°	64°43.6'	-57.1'	161.2°	63°46.7'	-57.3'	161.8°	62°49.6'	-57.5'	162.4°	61°52.3'	-57.7'	163.0°	60°54.8'	-57.9'	163.5°	8
9	65°40.1'	-56.8'	160.5°	64°43.4'	-57.1'	161.2°	63°46.5'	-57.3'	161.9°	62°49.4'	-57.5'	162.5°	61°51.9'	-57.6'	163.1°	60°54.6'	-57.8'	163.6°	59°57.0'	-58.0'	164.1°	9
10	64°43.3'	-57.0'	161.3°	63°46.4'	-57.3'	161.9°	62°49.2'	-57.5'	162.5°	61°51.9'	-57.6'	163.1°	60°54.4'	-57.8'	163.6°	59°56.8'	-58.0'	164.1°	58°59.0'	-58.1'	164.6°	10
11	63°46.3'	-57.2'	162.0°	62°49.1'	-57.4'	162.6°	61°51.8'	-57.6'	163.2°	60°54.3'	-57.8'	163.7°	59°56.6'	-57.9'	164.2°	58°58.8'	-58.1'	164.6°	58°00.9'	-58.2'	165.1°	11
12	62°49.1'	-57.4'	162.7°	61°51.7'	-57.6'	163.2°	60°54.2'	-57.8'	163.7°	59°56.5'	-57.9'	164.2°	58°58.7'	-58.0'	164.7°	58°00.8'	-58.2'	165.1°	57°02.7'	-58.3'	165.5°	12
13	61°51.7'	-57.6'	163.3°	60°54.1'	-57.7'	163.8°	59°56.4'	-57.9'	164.3°	58°58.6'	-58.0'	164.7°	58°00.7'	-58.1'	165.2°	57°02.6'	-58.3'	165.6°	56°04.4'	-58.4'	165.9°	13
14	60°54.1'	-57.7'	163.9°	59°56.4'	-57.9'	164.4°	58°58.5'	-58.0'	164.8°	58°00.6'	-58.1'	165.2°	57°02.5'	-58.2'	165.6°	56°04.3'	-58.4'	166.0°	55°06.1'	-58.4'	166.3°	14
15	59°56.4'	-57.8'	164.4°	58°58.5'	-58.0'	164.9°	58°00.5'	-58.1'	165.3°	57°02.5'	-58.2'	165.7°	56°04.3'	-58.3'	166.1°	55°06.0'	-58.4'	166.4°	54°07.6'	-58.5'	166.7°	15
16	58°58.5'	-58.0'	165.0°	58°00.5'	-58.1'	165.4°	57°02.4'	-58.2'	165.8°	56°04.2'	-58.3'	166.2°	55°05.9'	-58.4'	166.5°	54°07.6'	-58.5'	166.8°	53°09.1'	-58.6'	167.1°	16
17	58°00.6'	-58.1'	165.5°	57°02.5'	-58.2'	165.8°	56°04.2'	-58.3'	166.2°	55°05.9'	-58.4'	166.5°	54°07.5'	-58.5'	166.9°	53°09.1'	-58.6'	167.2°	52°10.5'	-58.6'	167.5°	17
18	57°02.5'	-58.2'	165.9°	56°04.3'	-58.3'	166.3°	55°05.9'	-58.4'	166.6°	54°07.5'	-58.5'	166.9°	53°09.0'	-58.6'	167.2°	52°10.5'	-58.6'	167.5°	51°11.9'	-58.7'	167.8°	18
19	56°04.3'	-58.3'	166.4°	55°06.0'	-58.4'	166.7°	54°07.6'	-58.5'	167.0°	53°09.1'	-58.5'	167.3°	52°10.5'	-58.6'	167.6°	51°11.8'	-58.7'	167.9°	50°13.2'	-58.8'	168.2°	19
20	55°06.1'	-58.3'	166.8°	54°07.6'	-58.4'	167.1°	53°09.1'	-58.5'	167.4°	52°10.5'	-58.6'	167.7°	51°11.9'	-58.7'	168.0°	50°13.2'	-58.7'	168.2°	49°14.4'	-58.8'	168.4°	20
21	54°07.7'	-58.4'	167.2°	53°09.2'	-58.5'	167.5°	52°10.6'	-58.6'	167.8°	51°11.9'	-58.7'	168.0°	49°14.5'	-58.8'	168.3°	48°15.7'	-58.8'	168.8°	47°16.7'	-58.9'	169.0°	21
22	53°09.3'	-58.5'	167.6°	52°10.7'	-58.6'	167.9°	51°12.0'	-58.6'	168.1°	50°13.3'	-58.7'	168.4°	49°14.5'	-58.8'	168.8°	48°15.7'	-58.8'	169.1°	46°17.8'	-58.9'	169.3°	22
23	52°10.8'	-58.6'	167.9°	51°12.1'	-58.6'	168.2°	50°13.3'	-58.7'	168.4°	49°14.5'	-58.8'	168.7°	48°15.7'	-58.8'	168.9°	47°16.8'	-58.9'	169.1°	46°17.8'	-58.9'	169.3°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

8° 352° LHA

Latitude CONTRARY to DECLINATION

8° 352° LHA

South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

7° 353° LHA			Latitude CONTRARY to Declination						7° 353° LHA													
Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	74°22.7'	-54.2'	153.1°	73°28.9'	-54.9'	154.6°	72°34.3'	-55.5'	156.0°	71°39.3'	-55.9'	157.2°	70°43.7'	-56.4'	158.3°	69°47.8'	-56.7'	159.3°	68°51.5'	-57.0'	160.3°	0
1	73°28.4'	-54.9'	154.6°	72°34.0'	-55.4'	156.0°	71°38.9'	-55.9'	157.2°	70°43.3'	-56.3'	158.3°	69°47.4'	-56.7'	159.3°	68°51.1'	-57.0'	160.3°	67°54.4'	-57.3'	161.1°	1
2	72°33.6'	-55.4'	156.0°	71°38.5'	-55.9'	157.2°	70°43.0'	-56.3'	158.4°	69°47.0'	-56.6'	159.4°	68°50.7'	-57.0'	160.3°	67°54.1'	-57.2'	161.1°	66°57.2'	-57.5'	161.9°	2
3	71°38.2'	-55.8'	157.3°	70°42.7'	-56.2'	158.4°	69°46.7'	-56.6'	159.4°	68°50.4'	-56.9'	160.3°	67°53.7'	-57.2'	161.1°	66°56.8'	-57.4'	161.9°	65°59.7'	-57.7'	162.6°	3
4	70°42.4'	-56.2'	158.4°	69°46.4'	-56.6'	159.4°	68°50.1'	-56.9'	160.3°	67°53.5'	-57.2'	161.2°	66°56.5'	-57.4'	161.9°	65°59.4'	-57.6'	162.6°	65°02.0'	-57.8'	163.3°	4
5	69°46.2'	-56.5'	159.4°	68°49.9'	-56.9'	160.4°	67°53.2'	-57.1'	161.2°	66°56.3'	-57.4'	161.9°	65°59.1'	-57.6'	162.6°	64°04.0'	-58.0'	163.9°	63°06.2'	-58.0'	163.9°	5
6	68°49.7'	-56.8'	160.4°	67°53.0'	-57.1'	161.2°	66°56.1'	-57.4'	162.0°	65°58.9'	-57.6'	162.7°	65°01.5'	-57.8'	163.3°	64°04.0'	-58.0'	163.9°	63°06.2'	-58.1'	164.5°	6
7	67°52.8'	-57.1'	161.3°	66°55.9'	-57.3'	162.0°	65°58.7'	-57.6'	162.7°	65°01.3'	-57.8'	163.4°	64°03.7'	-57.9'	163.9°	63°06.0'	-58.1'	164.5°	62°08.1'	-58.2'	165.0°	7
8	66°55.8'	-57.3'	162.1°	65°58.6'	-57.5'	162.8°	65°01.2'	-57.7'	163.4°	64°03.6'	-57.9'	164.0°	63°05.8'	-58.1'	164.5°	62°07.9'	-58.2'	165.0°	61°09.9'	-58.3'	165.5°	8
9	65°58.4'	-57.5'	162.8°	65°01.0'	-57.7'	163.4°	64°03.4'	-57.9'	164.0°	63°05.7'	-58.0'	164.6°	62°07.8'	-58.2'	165.1°	61°09.7'	-58.3'	165.5°	60°11.6'	-58.4'	166.0°	9
10	65°00.9'	-57.7'	163.5°	64°03.3'	-57.9'	164.1°	63°05.5'	-58.0'	164.6°	62°07.6'	-58.2'	165.1°	61°09.6'	-58.3'	165.6°	60°11.4'	-58.4'	166.0°	59°13.1'	-58.5'	166.4°	10
11	64°03.3'	-57.8'	164.1°	63°05.5'	-58.0'	164.7°	62°07.5'	-58.1'	165.2°	61°09.5'	-58.3'	165.6°	60°11.3'	-58.4'	166.1°	59°13.0'	-58.5'	166.5°	58°14.6'	-58.6'	166.9°	11
12	63°05.4'	-58.0'	164.7°	62°07.5'	-58.1'	165.2°	61°09.4'	-58.3'	165.7°	60°11.2'	-58.4'	166.1°	59°12.9'	-58.5'	166.5°	58°14.5'	-58.6'	166.9°	57°16.0'	-58.7'	167.3°	12
13	62°07.4'	-58.1'	165.3°	61°09.3'	-58.2'	165.8°	60°11.1'	-58.4'	166.2°	59°12.8'	-58.5'	166.6°	58°14.4'	-58.6'	167.0°	57°15.9'	-58.7'	167.3°	56°17.3'	-58.7'	167.6°	13
14	61°09.3'	-58.2'	165.8°	60°11.1'	-58.3'	166.2°	59°12.8'	-58.5'	166.6°	58°14.3'	-58.6'	167.0°	57°15.8'	-58.6'	167.4°	56°17.2'	-58.7'	167.7°	55°18.6'	-58.8'	168.0°	14
15	60°11.1'	-58.3'	166.3°	59°12.7'	-58.4'	166.7°	58°14.3'	-58.5'	167.1°	57°15.8'	-58.6'	167.4°	56°17.2'	-58.7'	167.8°	55°18.5'	-58.8'	168.1°	54°19.8'	-58.9'	168.4°	15
16	59°12.8'	-58.4'	166.8°	58°14.3'	-58.5'	167.1°	57°15.8'	-58.6'	167.5°	56°17.2'	-58.7'	167.8°	55°18.5'	-58.8'	168.1°	54°19.7'	-58.8'	168.4°	53°20.9'	-58.9'	168.7°	16
17	58°14.3'	-58.5'	167.2°	57°15.8'	-58.6'	167.6°	56°17.2'	-58.7'	167.9°	55°18.5'	-58.8'	168.2°	54°19.7'	-58.8'	168.5°	53°20.9'	-58.9'	168.7°	52°22.0'	-59.0'	169.0°	17
18	57°15.8'	-58.6'	167.6°	56°17.2'	-58.7'	167.9°	55°18.5'	-58.7'	168.3°	54°19.7'	-58.8'	168.5°	53°20.9'	-58.9'	168.9°	52°22.0'	-59.0'	169.1°	51°23.1'	-59.0'	169.3°	18
19	56°17.2'	-58.7'	168.0°	55°18.5'	-58.7'	168.3°	54°19.7'	-58.8'	168.3°	53°20.9'	-58.9'	168.9°	52°22.0'	-59.0'	169.1°	51°23.1'	-59.0'	169.4°	50°24.1'	-59.0'	169.6°	19
20	55°18.6'	-58.7'	168.4°	54°19.8'	-58.8'	168.7°	53°20.9'	-58.9'	168.9°	52°22.0'	-59.0'	169.2°	51°23.1'	-59.0'	169.4°	50°24.1'	-59.0'	169.6°	49°25.0'	-59.1'	169.9°	20
21	54°19.9'	-58.8'	168.7°	53°21.0'	-58.8'	169.0°	52°22.1'	-58.9'	169.3°	51°23.2'	-59.0'	1										

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

6° 354° LHA			Latitude CONTRARY to Declination						6° 354° LHA													
Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	74°47.5'	-55.6'	156.5°	73°52.2'	-56.1'	157.9°	72°56.4'	-56.6'	159.1°	72°00.1'	-56.9'	160.2°	71°03.5'	-57.3'	161.2°	70°06.5'	-57.5'	162.1°	69°09.3'	-57.8'	162.9°	0
1	73°51.9'	-56.1'	157.9°	72°56.1'	-56.5'	159.1°	71°59.8'	-56.9'	160.2°	71°03.2'	-57.2'	161.2°	70°06.2'	-57.5'	162.1°	69°09.0'	-57.7'	162.9°	68°11.5'	-58.0'	163.7°	1
2	72°55.8'	-56.5'	159.2°	71°59.6'	-56.9'	160.2°	71°02.9'	-57.2'	161.2°	70°05.9'	-57.5'	162.1°	69°08.7'	-57.7'	162.9°	68°11.2'	-57.9'	163.7°	67°13.6'	-58.1'	164.3°	2
3	71°59.3'	-56.8'	160.3°	71°02.7'	-57.2'	161.3°	70°05.7'	-57.4'	162.1°	69°08.5'	-57.7'	163.0°	68°11.0'	-57.9'	163.7°	67°13.3'	-58.1'	164.4°	66°15.4'	-58.3'	165.0°	3
4	71°02.5'	-57.1'	161.3°	70°05.5'	-57.4'	162.2°	69°08.3'	-57.7'	163.0°	68°10.8'	-57.9'	163.7°	67°13.1'	-58.1'	164.4°	66°15.2'	-58.2'	165.0°	65°17.2'	-58.4'	165.6°	4
5	70°05.3'	-57.4'	162.2°	69°08.1'	-57.6'	163.0°	68°10.6'	-57.9'	163.7°	67°12.9'	-58.0'	164.4°	66°15.0'	-58.2'	165.0°	65°17.0'	-58.4'	165.6°	64°18.8'	-58.5'	166.1°	5
6	69°07.9'	-57.6'	163.0°	68°10.4'	-57.8'	163.8°	67°12.7'	-58.0'	164.4°	66°14.9'	-58.2'	165.0°	65°16.8'	-58.3'	165.6°	64°18.6'	-58.5'	166.1°	63°20.3'	-58.6'	166.6°	6
7	68°10.3'	-57.8'	163.8°	67°12.6'	-58.0'	164.5°	66°14.7'	-58.2'	165.1°	65°16.7'	-58.3'	165.6°	64°18.5'	-58.5'	166.2°	63°20.2'	-58.6'	166.6°	62°21.7'	-58.7'	167.1°	7
8	67°12.5'	-58.0'	164.5°	66°14.6'	-58.2'	165.1°	65°16.5'	-58.3'	165.7°	64°18.3'	-58.4'	166.2°	63°20.0'	-58.6'	166.7°	62°21.6'	-58.7'	167.1°	61°23.0'	-58.8'	167.5°	8
9	66°14.5'	-58.1'	165.2°	65°16.4'	-58.3'	165.7°	64°18.2'	-58.4'	166.2°	63°19.9'	-58.5'	166.7°	62°21.4'	-58.6'	167.2°	61°22.8'	-58.7'	167.6°	60°24.3'	-58.8'	167.9°	9
10	65°16.4'	-58.3'	165.8°	64°18.2'	-58.4'	166.3°	63°19.8'	-58.5'	166.7°	62°21.4'	-58.6'	167.2°	61°22.8'	-58.7'	167.6°	60°24.2'	-58.8'	168.0°	59°25.4'	-58.9'	168.3°	10
11	64°18.1'	-58.4'	166.3°	63°19.7'	-58.5'	166.8°	62°21.3'	-58.6'	167.2°	61°22.7'	-58.7'	167.6°	60°24.1'	-58.8'	168.0°	59°25.3'	-58.9'	168.4°	58°26.5'	-59.0'	168.7°	11
12	63°19.7'	-58.5'	166.8°	62°21.2'	-58.6'	167.3°	61°22.7'	-58.7'	167.7°	60°24.0'	-58.8'	168.1°	59°25.3'	-58.9'	168.4°	58°26.5'	-58.9'	168.7°	57°27.6'	-59.0'	169.0°	12
13	62°21.2'	-58.6'	167.3°	61°22.6'	-58.7'	167.7°	60°24.0'	-58.8'	168.1°	59°25.2'	-58.9'	168.5°	58°26.4'	-58.9'	168.8°	57°27.5'	-59.0'	169.1°	56°28.6'	-59.1'	169.4°	13
14	61°22.6'	-58.7'	167.8°	60°23.9'	-58.8'	168.2°	59°25.2'	-58.9'	168.5°	58°26.3'	-58.9'	168.8°	57°27.5'	-59.0'	169.1°	56°28.5'	-59.1'	169.4°	55°29.5'	-59.1'	169.7°	14
15	60°23.9'	-58.8'	168.2°	59°25.2'	-58.8'	168.6°	58°26.3'	-58.9'	168.9°	57°27.4'	-59.0'	169.2°	56°28.5'	-59.0'	169.5°	55°29.4'	-59.1'	169.7°	54°30.4'	-59.2'	170.0°	15
16	59°25.2'	-58.8'	168.6°	58°26.3'	-58.9'	168.9°	57°27.4'	-59.0'	169.3°	56°28.4'	-59.0'	169.6°	55°29.4'	-59.1'	169.8°	54°30.3'	-59.1'	170.0°	53°31.2'	-59.2'	170.3°	16
17	58°26.3'	-58.9'	169.0°	57°27.4'	-59.0'	169.3°	56°28.4'	-59.0'	169.6°	55°29.4'	-59.1'	169.9°	54°30.3'	-59.1'	170.1°	53°31.2'	-59.2'	170.3°	52°32.0'	-59.2'	170.6°	17
18	57°27.5'	-59.0'	169.4°	56°28.5'	-59.0'	169.6°	55°29.4'	-59.1'	169.9°	54°30.3'	-59.1'	170.1°	53°31.2'	-59.2'	170.4°	52°32.0'	-59.2'	170.6°	51°32.8'	-59.3'	170.9°	18
19	56°28.5'	-59.0'	169.7°	55°29.4'	-59.1'	170.0°	54°30.3'	-59.1'	170.2°	53°31.2'	-59.2'	170.4°	52°32.0'	-59.2'	170.6°	51°32.8'	-59.3'	170.9°	49°34.3'	-59.3'	171.6°	19
20	55°29.5'	-59.1'	170.0°	54°30.4'	-59.1'	170.3°	53°31.2'	-59.2'	170.5°	52°32.1'	-59.2'	170.8°	51°32.8'	-59.3'	171.0°	50°33.6'	-59.3'	171.1°	49°34.2'	-59.3'	171.3°	20
21	54°30.4'	-59.1'	170.3°	53°31.3'	-59.1'	170.6°	52°32.1'	-59.2'	170.8°	51°32.9'	-59.2'	171.0°	50°33.6'	-59.3'	171.2°	49°34.3'	-59.3'	171.4°	48°34.9'	-59.3'	171.5°	21
22	53°31.3'	-59.1'	170.6°	52°32.1'	-59.2'	170.8°	51°32.9'	-59.2'	171.0°	50°33.6'	-59.3'	171.2°	49°34.3'	-59.3'	171.4°	48°34.9'	-59.3'	171.6°	47°35.6'	-59.4'	171.7°	22
23	52°32.2'	-59.2'	170.9°	51°32.9'	-59.2'	171.1°	50°33.6'	-59.3'	171.3°	49°34.3'	-59.3'	171.5°	48°35.0'	-59.3'	171.6°	47°35.6'	-59.4'	171.8°	46°36.2'	-59.4'	171.9°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

6° 354° LHA Latitude CONTRARY to DECLINATION 6° 354° LHA
 South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

5° 355° LHA			Latitude CONTRARY to Declination						5° 355° LHA													
Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	75°09.0'	-56.8'	160.1°	74°12.4'	-57.2'	161.3°	73°15.4'	-57.5'	162.4°	72°18.0'	-57.8'	163.3°	71°20.4'	-58.1'	164.2°	70°22.6'	-58.2'	165.0°	69°24.6'	-58.4'	165.7°	0
1	74°12.2'	-57.2'	161.3°	73°15.2'	-57.5'	162.4°	72°17.8'	-57.8'	163.3°	71°20.2'	-58.0'	164.2°	70°22.4'	-58.2'	165.0°	69°24.3'	-58.4'	165.7°	68°26.1'	-58.6'	166.3°	1
2	73°15.0'	-57.5'	162.4°	72°17.7'	-57.8'	163.4°	71°20.0'	-58.0'	164.2°	70°22.2'	-58.2'	165.0°	69°24.2'	-58.4'	165.7°	68°25.9'	-58.5'	166.3°	67°27.6'	-58.7'	166.9°	2
3	72°17.5'	-57.8'	163.4°	71°19.9'	-58.0'	164.2°	70°22.0'	-58.2'	165.0°	69°24.0'	-58.4'	165.7°	68°25.8'	-58.5'	166.3°	67°27.4'	-58.7'	166.9°	66°28.9'	-58.8'	167.4°	3
4	71°19.7'	-58.0'	164.2°	70°21.9'	-58.2'	165.0°	69°23.8'	-58.4'	165.7°	68°25.6'	-58.5'	166.3°	67°27.3'	-58.6'	166.9°	66°28.8'	-58.8'	167.4°	65°30.1'	-58.9'	167.9°	4
5	70°21.8'	-58.2'	165.0°	69°23.7'	-58.3'	165.7°	68°25.5'	-58.5'	166.3°	67°27.1'	-58.6'	166.9°	66°28.6'	-58.7'	167.4°	65°30.0'	-58.8'	167.9°	64°31.3'	-58.9'	168.4°	5
6	69°23.6'	-58.3'	165.7°	68°25.4'	-58.5'	166.4°	67°27.0'	-58.6'	166.9°	66°28.5'	-58.7'	167.5°	65°29.9'	-58.8'	167.9°	64°31.2'	-58.9'	168.4°	63°32.3'	-59.0'	168.8°	6
7	68°25.3'	-58.5'	166.4°	67°26.9'	-58.6'	167.0°	66°28.4'	-58.7'	167.5°	65°29.8'	-58.8'	168.0°	64°31.0'	-58.9'	168.4°	63°32.2'	-59.0'	168.8°	62°33.3'	-59.1'	169.2°	7
8	67°26.8'	-58.6'	167.0°	66°28.3'	-58.7'	167.5°	65°29.7'	-58.8'	168.0°	64°30.9'	-58.9'	168.4°	63°32.1'	-59.0'	168.8°	62°33.2'	-59.1'	169.2°	61°34.3'	-59.1'	169.6°	8
9	66°28.3'	-58.7'	167.5°	65°29.6'	-58.8'	168.0°	64°30.9'	-58.9'	168.5°	63°32.0'	-59.0'	168.9°	62°33.1'	-59.1'	169.2°	61°34.2'	-59.1'	169.6°	60°35.1'	-59.2'	169.9°	9
10	65°29.6'	-58.8'	168.1°	64°30.8'	-58.9'	168.5°	63°32.0'	-59.0'	168.9°	62°33.1'	-59.0'	169.3°	61°34.1'	-59.1'	169.6°	60°35.0'	-59.2'	169.9°	59°35.9'	-59.2'	170.2°	10
11	64°30.8'	-58.9'	168.5°	63°31.9'	-59.0'	168.9°	62°33.0'	-59.0'	169.3°	61°34.0'	-59.1'	169.6°	60°35.0'	-59.2'	170.0°	59°35.9'	-59.2'	170.3°	58°36.7'	-59.3'	170.5°	11
12	63°31.9'	-58.9'	169.0°	62°33.0'	-59.0'	169.3°	61°34.0'	-59.1'	169.7°	60°34.9'	-59.1'	170.0°	59°35.8'	-59.2'	170.3°	58°36.6'	-59.3'	170.6°	57°37.4'	-59.3'	170.8°	12
13	62°33.0'	-59.0'	169.4°	61°34.0'	-59.1'	169.7°	60°34.9'	-59.1'	170.0°	59°35.7'	-59.2'	170.4°	58°36.6'	-59.3'	170.6°	57°37.4'	-59.3'	170.9°	56°38.1'	-59.3'	171.1°	13
14	61°34.0'	-59.1'	169.8°	60°34.9'	-59.1'	170.1°	59°35.7'	-59.2'	170.4°	58°36.5'	-59.2'	170.7°	57°37.3'	-59.3'	171.0°	56°38.1'	-59.3'	171.2°	55°38.8'	-59.4'	171.4°	14
15	60°34.9'	-59.1'	170.1°	59°35.7'	-59.2'	170.4°	58°36.5'	-59.2'	170.7°	57°37.3'	-59.3'	171.0°	56°38.0'	-59.3'	171.2°	55°38.7'	-59.4'	171.4°	54°39.4'	-59.4'	171.6°	15
16	59°35.7'	-59.2'	170.5°	58°36.5'	-59.2'	170.7°	57°37.3'	-59.3'	171.0°	56°38.0'	-59.3'	171.2°	55°38.7'	-59.4'	171.5°	54°39.4'	-59.4'	171.7°	53°40.0'	-59.4'	171.9°	16
17	58°36.6'	-59.2'	170.8°	57°37.3'	-59.3'	171.0°	56°38.0'	-59.3'	171.3°	55°38.7'	-59.4'	171.5°	54°39.3'	-59.4'	171.7°	53°40.0'	-59.4'	171.9°	52°40.5'	-59.5'	172.1°	17
18	57°37.3'	-59.3'	171.1°	56°38.0'	-59.3'	171.3°	55°38.7'	-59.4'	171.6°	54°39.3'	-59.4'	171.8°	53°39.9'	-59.4'	172.0°	52°40.5'	-59.5'	172.1°	51°41.1'	-59.5'	172.3°	18
19	56°38.1'	-59.3'	171.4°	55°38.7'	-59.3'	171.6°	54°39.4'	-59.4'	171.8°	53°40.0'	-59.4'	172.0°	52°40.5'	-59.4'	172.2°	51°41.1'	-59.5'	172.4°	50°41.6'	-59.5'	172.5°	19
20	55°38.8'	-59.3'	171.7°	54°39.4'	-59.4'	171.9°	53°40.0'	-59.4'	172.1°	52°40.5'	-59.4'	172.2°	51°41.1'	-59.5'	172.4°	50°41.6'	-59.5'	172.6°	49°42.1'	-59.5'	172.7°	20
21	54°39.4'	-59.4'	171.9°	53°40.0'	-59.4'	172.1°	52°40.6'	-59.4'	172.3°	51°41.1'	-59.5'	172.5°	50°41.6'	-59.5'	172.6°	49°42.1'	-59.5'	172.8°	48°42.6'	-59.5'	172.9°	

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

4° 356° LHA		Latitude CONTRARY to Declination										4° 356° LHA										
Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	75°27.0'	-57.9'	163.9°	74°29.3'	-58.2'	164.9°	73°31.2'	-58.4'	165.8°	72°33.0'	-58.6'	166.5°	71°34.5'	-58.7'	167.2°	70°35.9'	-58.9'	167.9°	69°37.2'	-59.0'	168.4°	0
1	74°29.1'	-58.2'	164.9°	73°31.1'	-58.4'	165.8°	72°32.8'	-58.6'	166.6°	71°34.4'	-58.7'	167.3°	70°35.7'	-58.8'	167.9°	69°36.9'	-59.0'	168.5°	68°38.1'	-59.1'	169.0°	1
2	73°30.9'	-58.4'	165.8°	72°32.7'	-58.5'	166.6°	71°34.3'	-58.7'	167.3°	70°35.7'	-58.8'	167.9°	69°36.9'	-59.0'	168.5°	68°38.1'	-59.1'	169.0°	67°39.2'	-59.1'	169.4°	2
3	72°32.6'	-58.5'	166.6°	71°34.2'	-58.7'	167.3°	70°35.6'	-58.8'	167.9°	69°36.8'	-58.9'	168.5°	68°38.0'	-59.0'	169.0°	67°39.1'	-59.1'	169.4°	66°40.0'	-59.2'	169.9°	3
4	71°34.1'	-58.7'	167.3°	70°35.5'	-58.8'	167.9°	69°36.7'	-58.9'	168.5°	68°37.9'	-59.0'	169.0°	67°39.0'	-59.1'	169.5°	66°39.9'	-59.2'	169.9°	65°40.8'	-59.3'	170.3°	4
5	70°35.4'	-58.8'	167.9°	69°36.7'	-58.9'	168.5°	68°37.8'	-59.0'	169.0°	67°38.9'	-59.1'	169.5°	66°39.8'	-59.2'	170.3°	65°40.6'	-59.2'	170.3°	64°41.5'	-59.3'	170.7°	5
6	69°36.6'	-58.9'	168.5°	68°37.7'	-59.0'	169.0°	67°38.8'	-59.1'	169.5°	66°39.8'	-59.2'	169.9°	65°40.6'	-59.2'	170.3°	64°41.4'	-59.3'	170.7°	63°42.2'	-59.4'	171.0°	6
7	68°37.7'	-59.0'	169.0°	67°38.7'	-59.1'	169.5°	66°39.7'	-59.2'	169.9°	65°40.6'	-59.3'	170.3°	64°41.4'	-59.3'	170.7°	63°42.2'	-59.4'	171.0°	62°42.9'	-59.4'	171.3°	7
8	67°38.7'	-59.1'	169.5°	66°39.6'	-59.2'	170.0°	65°40.5'	-59.2'	170.3°	64°41.3'	-59.3'	170.7°	63°42.1'	-59.3'	171.0°	62°42.8'	-59.4'	171.3°	61°43.5'	-59.4'	171.6°	8
9	66°39.6'	-59.2'	170.0°	65°40.5'	-59.2'	170.4°	64°41.3'	-59.3'	170.7°	63°42.0'	-59.3'	171.1°	62°42.7'	-59.4'	171.4°	61°43.4'	-59.4'	171.6°	60°44.0'	-59.5'	171.9°	9
10	65°40.5'	-59.2'	170.4°	64°41.3'	-59.3'	170.8°	63°42.0'	-59.3'	171.1°	62°42.7'	-59.4'	171.4°	61°43.3'	-59.4'	171.7°	60°43.9'	-59.5'	171.9°	59°44.6'	-59.5'	172.2°	10
11	64°41.2'	-59.3'	170.8°	63°42.0'	-59.3'	171.1°	62°42.7'	-59.4'	171.4°	61°43.3'	-59.4'	171.7°	60°43.9'	-59.5'	172.0°	59°44.5'	-59.5'	172.2°	58°45.1'	-59.5'	172.4°	11
12	63°42.0'	-59.3'	171.1°	62°42.7'	-59.4'	171.4°	61°43.3'	-59.4'	171.7°	60°43.9'	-59.5'	172.0°	59°44.5'	-59.5'	172.2°	58°45.0'	-59.5'	172.4°	57°45.5'	-59.6'	172.7°	12
13	62°42.6'	-59.4'	171.5°	61°43.3'	-59.4'	171.8°	60°43.9'	-59.4'	172.0°	59°44.5'	-59.5'	172.2°	58°45.0'	-59.5'	172.5°	57°45.5'	-59.6'	172.7°	56°46.0'	-59.6'	172.9°	13
14	61°43.3'	-59.4'	171.8°	60°43.9'	-59.4'	172.0°	59°44.4'	-59.5'	172.3°	58°45.0'	-59.5'	172.5°	57°45.5'	-59.5'	172.7°	56°45.9'	-59.6'	172.9°	55°46.4'	-59.6'	173.1°	14
15	60°43.9'	-59.4'	172.1°	59°44.4'	-59.5'	172.3°	58°45.0'	-59.5'	172.5°	57°45.5'	-59.5'	172.7°	56°45.9'	-59.6'	172.9°	55°46.4'	-59.6'	173.1°	54°46.8'	-59.6'	173.3°	15
16	59°44.4'	-59.5'	172.4°	58°45.0'	-59.5'	172.6°	57°45.4'	-59.5'	172.8°	56°45.9'	-59.6'	173.0°	55°46.3'	-59.6'	173.2°	54°46.8'	-59.6'	173.3°	53°47.2'	-59.6'	173.5°	16
17	58°45.0'	-59.5'	172.6°	57°45.5'	-59.5'	172.8°	56°45.9'	-59.6'	173.0°	55°46.3'	-59.6'	173.2°	54°46.8'	-59.6'	173.4°	53°47.1'	-59.6'	173.6°	52°47.5'	-59.7'	173.7°	17
18	57°45.5'	-59.5'	172.9°	56°45.9'	-59.6'	173.0°	55°46.3'	-59.6'	173.2°	54°46.8'	-59.6'	173.4°	53°47.1'	-59.6'	173.6°	52°47.5'	-59.7'	173.7°	51°47.9'	-59.7'	173.8°	18
19	56°45.9'	-59.6'	173.1°	55°46.4'	-59.6'	173.3°	54°46.8'	-59.6'	173.4°	53°47.2'	-59.6'	173.6°	52°47.5'	-59.6'	173.7°	51°47.9'	-59.7'	173.9°	50°48.2'	-59.7'	174.0°	19
20	55°46.4'	-59.6'	173.3°	54°46.8'	-59.6'	173.5°	53°47.2'	-59.6'	173.6°	52°47.5'	-59.6'	173.8°	51°47.9'	-59.7'	173.9°	50°48.2'	-59.7'	174.0°	49°48.5'	-59.7'	174.2°	20
21	54°46.8'	-59.6'	173.5°	53°47.2'	-59.6'	173.7°	52°47.5'	-59.6'	173.8°	51°47.9'	-59.7'	174.0°	50°48.2'	-59.7'	174.1°	49°48.5'	-59.7'	174.2°	48°48.8'	-59.7'	174.3°	21
22	53°47.2'	-59.6'	173.7°	52°47.5'	-59.6'	173.9°	51°47.9'	-59.7'	174.0°	50°48.2'	-59.7'	174.1°	49°48.5'	-59.7'	174.2°	48°48.8'	-59.7'	174.3°	47°49.1'	-59.7'	174.5°	22
23	52°47.6'	-59.6'	173.9°	51°47.9'	-59.7'	174.0°	50°48.3'	-59.7'	174.2°	49°48.6'	-59.7'	174.3°	48°48.8'	-59.7'	174.4°	47°49.1'	-59.7'	174.5°	46°49.4'	-59.7'	174.6°	23
Dec°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Dec°
	14			15			16			17			18			19			20			

4° 356° LHA Latitude CONTRARY to DECLINATION 4° 356° LHA
 South Lat. LHA > 180° . . Zn = 180-Z LHA < 180° . . Zn= 180+Z

North Lat. LHA > 180° . . . Zn = Z LHA < 180° . . Zn= 360-Z

3° 357° LHA		Latitude CONTRARY to Declination										3° 357° LHA										
Dec°	14			15			16			17			18			19			20			Dec°
	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	Hc°	d'	Z°	
0	75°41.3'	-58.8'	167.8°	74°42.6'	-59.0'	168.6°	73°43.7'	-59.1'	169.2°	72°44.7'	-59.2'	169.8°	71°45.6'	-59.3'	170.4°	70°46.4'	-59.4'	170.9°	69°47.1'	-59.4'	171.3°	0
1	74°42.5'	-58.9'	168.6°	73°43.6'	-59.1'	169.2°	72°44.6'	-59.2'	169.8°	71°45.5'	-59.3'	170.4°	70°46.3'	-59.3'	170.9°	69°47.0'	-59.4'	171.3°	68°47.7'	-59.5'	171.7°	1
2	73°43.5'	-59.1'	169.2°	72°44.6'	-59.2'	169.8°	71°45.4'	-59.3'	170.4°	70°46.2'	-59.3'	170.9°	69°47.0'	-59.4'	171.3°	68°47.6'	-59.5'	171.7°	67°48.2'	-59.5'	172.0°	2
3	72°44.5'	-59.2'	169.9°	71°45.4'	-59.3'	170.4°	70°46.2'	-59.3'	170.9°	69°46.9'	-59.4'	171.3°	68°47.6'	-59.5'	171.7°	67°48.2'	-59.5'	172.0°	66°48.7'	-59.5'	172.4°	3
4	71°45.3'	-59.2'	170.4°	70°46.1'	-59.3'	170.9°	69°46.9'	-59.4'	171.3°	68°47.5'	-59.4'	171.7°	67°48.1'	-59.5'	172.1°	66°48.7'	-59.5'	172.4°	65°49.2'	-59.6'	172.7°	4
5	70°46.1'	-59.3'	170.9°	69°46.8'	-59.4'	171.3°	68°47.5'	-59.4'	171.7°	67°48.1'	-59.5'	172.1°	66°48.6'	-59.5'	172.4°	65°49.1'	-59.6'	172.7°	64°49.6'	-59.6'	173.0°	5
6	69°46.8'	-59.4'	171.3°	68°47.4'	-59.4'	171.7°	67°48.0'	-59.5'	172.1°	66°48.6'	-59.5'	172.4°	65°49.1'	-59.6'	172.7°	64°49.5'	-59.6'	173.0°	63°50.0'	-59.6'	173.2°	6
7	68°47.4'	-59.4'	171.7°	67°48.0'	-59.5'	172.1°	66°48.5'	-59.5'	172.4°	65°49.0'	-59.6'	172.7°	64°49.5'	-59.6'	173.0°	63°49.9'	-59.6'	173.2°	62°50.3'	-59.7'	173.5°	7
8	67°48.0'	-59.5'	172.1°	66°48.5'	-59.5'	172.4°	65°49.0'	-59.6'	172.7°	64°49.5'	-59.6'	173.0°	63°49.9'	-59.6'	173.3°	62°50.3'	-59.7'	173.5°	61°50.7'	-59.7'	173.7°	8
9	66°48.5'	-59.5'	172.5°	65°49.0'	-59.6'	172.8°	64°49.5'	-59.6'	173.0°	63°49.9'	-59.6'	173.3°	62°50.3'	-59.7'	173.5°	61°50.7'	-59.7'	173.7°	60°51.0'	-59.7'	173.9°	9
10	65°49.0'	-59.6'	172.8°	64°49.4'	-59.6'	173.0°	63°49.9'	-59.6'	173.3°	62°50.3'	-59.7'	173.5°	61°50.6'	-59.7'	173.7°	60°50.9'	-59.7'	173.9°	59°51.3'	-59.7'	174.1°	10
11	64°49.4'	-59.6'	173.1°	63°49.8'	-59.6'	173.3°	62°50.2'	-59.6'	173.5°	61°50.6'	-59.7'	173.7°	60°50.9'	-59.7'	173.9°	59°51.3'	-59.7'	174.1°	58°51.6'	-59.7'	174.3°	11
12	63°49.8'	-59.6'	173.3°	62°50.2'	-59.6'	173.6°	61°50.6'	-59.7'	173.8°	60°50.9'	-59.7'	174.0°	59°51.3'	-59.7'	174.1°	58°51.6'	-59.7'	174.3°	57°51.8'	-59.7'	174.5°	12
13	62°50.2'	-59.6'	173.6°	61°50.6'	-59.7'	173.8°	60°50.9'	-59.7'	174.0°	59°51.2'	-59.7'	174.2°	58°51.5'	-59.7'	174.4°	57°51.8'	-59.7'	174.5°	56°52.1'	-59.8'	174.6°	13
14	61°50.6'	-59.7'	173.8°	60°50.9'	-59.7'	174.0°	59°51.2'	-59.7'	174.2°	58°51.5'	-59.7'	174.4°	57°51.8'	-59.7'	174.5°	56°52.1'	-59.8'	174.7°	55°52.3'	-59.8'	174.8°	14
15	60°50.9'	-59.7'	174.0°	59°51.2'	-59.7'	174.2°	58°51.5'	-59.7'	174.4°	57°51.8'	-59.7'	174.5°	56°52.1'	-59.8'	174.7°	55°52.3'	-59.8'	174.8°	54°52.6'	-59.8'	175.0°	15
16	59°51.2'	-59.7'	174.0°	58°51.5'	-59.7'	174.4°	57°51.8'	-59.7'	174.6°	56°52.1'	-59.8'	174.7°	55°52.3'	-59.8'	174.9°	54°52.5'	-59.8'	175.0°	53°52.8'	-59.8'	175.1°	16
17	58°51.5'	-59.7'	174.3°	57°51.8'	-59.7'	174.6°	56°52.1'	-59.8'	174.7°	55°52.3'	-59.8'	174.9°	54°52.5'	-59.8'	175.0°	53°52.8'	-59.8'	175.1°	52°53.0'	-59.8'	175.2°	17
18	57°51.8'	-59.7'	174.6°	56°52.1'	-59.7'	174.8°	55°52.3'	-59.8'	174.9°	54°52.5'	-59.8'	175.0°	53°52.8'	-59.8'	175.2°	52°53.0'	-59.8'	175.3°	51°53.2'	-59.8'	175.4°	18
19	56°52.1'	-59.7'	174.8°	55°52.3'	-59.8'	174.9°	54°52.5'	-59.8'	175.1°	53°52.8'	-59.8'	175.2°	52°53.0'	-59.8'	175.3°	51°53.2'	-59.8'	175.4°	50°53.4'	-59.8'	175.5°	19
20	55°52.3'	-59.8'	175.0°	54°52.6'	-59.8'	175.1°	53°52.8'	-59.8'	175.2°	52°53.0'	-59.8'	175.3°	51°53.2'	-59.8'	175.4°	50°53.4'	-59.8'	175.5°	49°53.5'	-59.8'	175.6°	20
21	54°52.6'	-59.8'	175.1°	53°52.8'	-59.8'	175.2°	52°53.0'	-59.8'	175.3°	51°53.2'	-59.8'	175.4°	50°53.4'	-59.8'	175.5°	49°53.5'	-					

SEMI DIAMETER (SD)

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1	16.29'	16.26'	16.17'	16.03'	15.90'	15.80'	15.75'	15.78'	15.87'	16.00'	16.14'	16.24'
3	16.29'	16.25'	16.16'	16.02'	15.89'	15.79'	15.75'	15.79'	15.89'	16.02'	16.15'	16.25'
6	16.29'	16.24'	16.14'	16.00'	15.88'	15.78'	15.75'	15.79'	15.90'	16.03'	16.17'	16.26'
9	16.29'	16.23'	16.13'	15.99'	15.86'	15.78'	15.75'	15.80'	15.91'	16.04'	16.18'	16.26'
12	16.28'	16.22'	16.12'	15.98'	15.85'	15.77'	15.76'	15.81'	15.92'	16.06'	16.19'	16.27'
15	16.28'	16.21'	16.10'	15.96'	15.84'	15.77'	15.76'	15.82'	15.94'	16.07'	16.20'	16.27'
18	16.28'	16.20'	16.09'	15.95'	15.83'	15.76'	15.76'	15.83'	15.95'	16.08'	16.21'	16.28'
21	16.27'	16.19'	16.08'	15.94'	15.82'	15.76'	15.76'	15.84'	15.96'	16.10'	16.22'	16.28'
24	16.27'	16.18'	16.06'	15.92'	15.81'	15.76'	15.77'	15.85'	15.98'	16.11'	16.23'	16.29'
27	16.26'	16.17'	16.05'	15.91'	15.81'	15.76'	15.77'	15.86'	15.99'	16.12'	16.24'	16.29'
30	16.26'	16.17'	16.04'	15.90'	15.80'	15.75'	15.78'	15.87'	16.00'	16.14'	16.24'	16.29'

Lower Limb, ADD.

Upper Limb, SUBTRACT

DIP Correction		
Meters	Dip °	Feet
0.4	1.11'	1.30
0.6	1.36'	1.95
0.8	1.57'	2.60
1.0	1.76'	3.25
1.2	1.93'	3.90
1.4	2.08'	4.55
1.6	2.23'	5.20
1.8	2.36'	5.85
2.0	2.49'	6.50
2.2	2.61'	7.15
2.4	2.73'	7.80
2.6	2.84'	8.45
2.8	2.95'	9.10
3.0	3.05'	9.75
3.2	3.15'	10.40
3.4	3.25'	11.05
3.6	3.34'	11.70
3.8	3.43'	12.35
4.0	3.52'	13.00

Always SUBTRACT

PARALLAX	
Alt (Ha)	Parallax
0	0.14'
5	0.14'
10	0.14'
15	0.14'
20	0.14'
25	0.13'
30	0.12'
35	0.12'
40	0.11'
45	0.10'
50	0.09'
55	0.08'
60	0.07'
65	0.06'
70	0.05'
75	0.04'
80	0.03'
85	0.01'
90	0.00'

Always ADD

Hs = Sextant Altitude
 Sextant Corrections
 Ha = Actual measure altitude
 Ha = Hs +/- Index Error (IE) - Dip
 Altitude Corrections
 Ho = True Observed Altitude
 Ho = Ha + Parallax - Refraction +/- SD
 ADD Index Error if OFF the arc
 SUBTRACT Index Error if ON the arc.

If using an artificial horizon Dip = 0.
 Add or Subtract IE as normal, then halve the angle Ha.
 Then apply the Altitude corrections as normal.

Alt (Ha)	mB & DegC			REFRACTION			mB & DegC		
	1000			1015			1030		
	10	20	30	10	20	30	10	20	30
1	24.14'	23.31'	22.54'	24.50'	23.66'	22.88'	24.86'	24.01'	23.22'
2	18.07'	17.46'	16.88'	18.34'	17.72'	17.13'	18.61'	17.98'	17.39'
3	14.23'	13.75'	13.29'	14.44'	13.95'	13.49'	14.66'	14.16'	13.69'
4	11.64'	11.25'	10.87'	11.82'	11.41'	11.04'	11.99'	11.58'	11.20'
5	9.80'	9.47'	9.16'	9.95'	9.61'	9.30'	10.10'	9.75'	9.43'
6	8.44'	8.15'	7.88'	8.57'	8.28'	8.00'	8.69'	8.40'	8.12'
7	7.39'	7.14'	6.91'	7.51'	7.25'	7.01'	7.62'	7.36'	7.11'
8	6.57'	6.34'	6.13'	6.67'	6.44'	6.23'	6.76'	6.53'	6.32'
9	5.90'	5.70'	5.51'	5.99'	5.78'	5.59'	6.08'	5.87'	5.68'
10	5.35'	5.17'	5.00'	5.43'	5.24'	5.07'	5.51'	5.32'	5.15'
12	4.50'	4.34'	4.20'	4.56'	4.41'	4.26'	4.63'	4.47'	4.32'
14	3.86'	3.73'	3.61'	3.92'	3.79'	3.66'	3.98'	3.84'	3.72'
16	3.38'	3.26'	3.16'	3.43'	3.31'	3.20'	3.48'	3.36'	3.25'
18	3.00'	2.89'	2.80'	3.04'	2.94'	2.84'	3.09'	2.98'	2.88'
20	2.68'	2.59'	2.50'	2.72'	2.63'	2.54'	2.76'	2.67'	2.58'
22	2.42'	2.34'	2.26'	2.46'	2.37'	2.30'	2.49'	2.41'	2.33'
24	2.20'	2.13'	2.06'	2.23'	2.16'	2.09'	2.27'	2.19'	2.12'
26	2.01'	1.94'	1.88'	2.04'	1.97'	1.91'	2.07'	2.00'	1.94'
28	1.85'	1.79'	1.73'	1.88'	1.81'	1.75'	1.90'	1.84'	1.78'
30	1.70'	1.65'	1.59'	1.73'	1.67'	1.62'	1.75'	1.69'	1.64'
35	1.41'	1.36'	1.31'	1.43'	1.38'	1.33'	1.45'	1.40'	1.35'
40	1.18'	1.14'	1.10'	1.19'	1.15'	1.11'	1.21'	1.17'	1.13'
45	0.99'	0.95'	0.92'	1.00'	0.97'	0.94'	1.02'	0.98'	0.95'
50	0.83'	0.80'	0.77'	0.84'	0.81'	0.79'	0.85'	0.82'	0.80'
55	0.69'	0.67'	0.65'	0.70'	0.68'	0.66'	0.71'	0.69'	0.67'
60	0.57'	0.55'	0.53'	0.58'	0.56'	0.54'	0.59'	0.57'	0.55'
65	0.46'	0.44'	0.43'	0.47'	0.45'	0.44'	0.47'	0.46'	0.44'
70	0.36'	0.35'	0.34'	0.36'	0.35'	0.34'	0.37'	0.36'	0.35'
75	0.26'	0.26'	0.25'	0.27'	0.26'	0.25'	0.27'	0.26'	0.25'
80	0.17'	0.17'	0.16'	0.18'	0.17'	0.16'	0.18'	0.17'	0.17'
85	0.09'	0.08'	0.08'	0.09'	0.08'	0.08'	0.09'	0.08'	0.08'
90	0.00'	0.00'	0.00'	0.00'	0.00'	0.00'	0.00'	0.00'	0.00'

Always SUBTRACT

